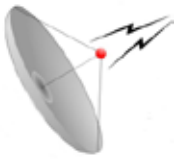

CAUTION: This stabilized antenna system is designed to be used with transmit/receive equipment manufactured by others. Refer to the documentation supplied by the manufacturer which will describe potential hazards, including exposure to RF radiation, associated with the improper use of the transmit/receive equipment. Note that the transmit/receive equipment will operate independently of the stabilized antenna system. **Prior to work on the stabilized antenna system, the power to the transmit/receive system must be locked out and tagged.**

When the transmit/receive system is in operation, no one should be allowed **anywhere within the radiated beam** being emitted from the reflector.

The ultimate responsibility for safety rests with the facility operator and the individuals who work on the system.

INSTALLATION AND OPERATION MANUAL

FOR SEA TEL BROADBAND-AT-SEA TRANSMIT / RECEIVE SYSTEM

MODEL: 6009-33 WITH SELECTABLE CO-POL OR CROSS-POL RECEIVE

PRELIMINARY

Sea Tel, Inc. **4030 Nelson Avenue** **Concord, CA 94520** **Tel: (925) 798-7979** **Fax: (925) 798-7986** **Email: seatel@cobham.com** **Web: www.cobham.com\seatel**	Sea Tel COBHAM	**Sea Tel Europe** **Unit 1, Orion Industrial Centre** **Wide Lane, Swaythling** **Southampton, UK S0 18 2HJ** **Tel: 44 (0)23 80 671155** **Fax: 44 (0)23 80 671166** **Email: seatel@cobham.com** **Web: www.cobham.com\seatel**

Sea Tel Inc doing business as Cobham SATCOM

July 10, 2009 **Document. No. 130374 Revision A**

These commodities, technology or software were exported from the United States in accordance with the Export Administration Regulations. Diversion contrary to U.S. law is prohibited.

Sea Tel Marine Stabilized Antenna systems are manufactured in the United States of America.

Sea Tel is an ISO 9001:2000 registered company. Certificate Number 19.2867 was issued August 12, 2005. Sea Tel was originally registered on November 09, 1998.

R&TTE

The Series 09 Family of Marine Stabilized Antenna Pedestals with DAC-2202 or DAC-2302 Antenna Control Unit complies with the requirements of directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on Radio equipment and Telecommunication Terminal Equipment. A copy of the R&TTE Declaration of Conformity for this equipment is contained in this manual.

The Sea Tel Model 5009 antenna will meet the off-axis EIRP spectral density envelope set forth in FCC 47 C.F.R. § 25.222(a)(1)-(4) when the input power density to the antenna system is limited to -15 dBW/4kHz.

The Sea Tel Model 5009 antenna contains FCC compliant supervisory software to continuously monitor the pedestal pointing accuracy and use it to control the "Transmit Mute" function of the satellite modem to satisfy the provisions of FCC 47 C.F.R. § 25.222(a)(7).

PRELIMINARY

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Revision History

REV	ECO#	Date	Description	By
A	N/A	July 10, 2009	Production Release.	MDN

Cobham SATCOM
Marine Systems, Sea Tel Products
4030 Nelson Ave., Concord
California, 94520 USA

Tel: +1 (925) 798-7979
Fax:+1 (925) 288-1420

R&TTE Declaration of Conformity

Doc Number 130411 Revision A

Sea Tel Inc. declares under our sole responsibility that the products identified below are in compliance with the requirements of:

DIRECTIVE 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on Radio equipment and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

Product Names: **4009 Ku Band Tx/Rx Maritime Satellite Earth Station**
5009 Ku Band Tx/Rx Maritime Satellite Earth Station
6009 Ku Band Tx/Rx Maritime Satellite Earth Station

PRELIMINARY

These products have been assessed to Conformity Procedures, Annex IV, of the above Directive by application of the following standards:

EMC:

EMC standard for Radio Equipment	**ETSI EN 301 489-1 V1.4.1 (2002-08)**
EMC standard for Radio Equipment	**ETSI EN 300 339 (1998-03)**
Marine Navigational and Radio Communication Equipment and Systems – General Requirements:	**IEC EN 60945:1997**

Satellite Earth Stations and System (SES):

Harmonized EN for Very Small Aperture Terminals (VSAT):	**ETSI EN 301 428-1 V1.3.1 (2006-02)**
Harmonized EN for satellite Earth Stations on board Vessels (ESVs)	**ETSI EN 302 340 V1.1.1 (2006-04)**

Safety:

Safety of Information Technology Equipment:	**IEC EN 60950-1:2001 (1st Edition)**

Certificates of Assessment were completed by and are on file at NEMKO USA Inc, San Diego, CA

Sea Tel, Inc
Concord, CA

Peter Blaney, Chief Engineer — Date 5/14/09

Cobham SATCOM
Marine Systems
Sea Tel Products
4030 Nelson Ave., Concord
California, 94520, USA
T: +1 (925) 798-7979
F: +1 (925) 798-7986

Declaration of Cobham SATCOM, Sea Tel, Inc.

1. Sea Tel designs, develops, manufactures and services marine stabilized antenna systems for satellite communications at sea. These products are in turn used by our customers as part of their Ku-band Earth Station on Vessels ("ESV") networks.

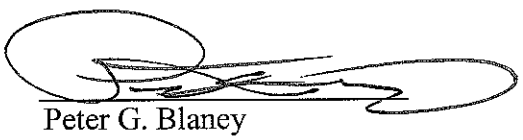
2. The Sea Tel Model 5009 antenna, referenced in paragraph 1, will meet the off-axis EIRP spectral density envelope set forth in FCC 47 C.F.R. § 25.222(a)(1)-(4) when the input power density to the antenna system is limited to -15 dBW/4kHz.

PRELIMINARY

3. The Sea Tel antennas referenced in paragraph 1 will maintain a stabilization pointing accuracy of better than 0.2 degrees under specified ship motion conditions. FCC compliant supervisory software has been developed to continuously monitor the pedestal pointing error and will trip an error flag whenever an unexpected event occurs that causes the instantaneous pointing error to exceed 0.5 degrees. This flag will not clear until the pedestal error decreases to 0.2 degrees or less. The state of this flag is used as an additional logic input to the existing "Transmit Mute" function of the Sea Tel below decks controller. By connecting the "Transmit Mute Output" of the Sea Tel below decks controller to the "Mute Input" of the satellite modem, the provisions of FCC 47 C.F.R. § 25.222(a)(7) are satisfied.

4. Sea Tel maintains all relevant test data, which is available upon request, to verify these declarations.

Executed on: 5/14/09

By: 

Peter G. Blaney
Chief Engineer, Sea Tel Products
Marine Systems, Cobham SATCOM

130445

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1. Introduction

WARNING: *RF Radiation Hazard - This stabilized antenna system is designed to be used with transmit/receive equipment manufactured by others. Refer to the documentation supplied by the manufacturer which will describe potential hazards, including exposure to RF radiation, associated with the improper use of the transmit/receive equipment. Note that the transmit/receive equipment will operate independently of the stabilized antenna system.*

The ultimate responsibility for safety rests with the facility operator and the individuals who work on the system.

1.1. General System Description

Your system includes a fully stabilized antenna that has been designed and manufactured so as to be inherently reliable, easy to maintain, and simple to operate. The equipment essentially permits unattended operation except for start-ups or when changing to different transponders, or satellites.

1.2. Purpose

This shipboard Transmit-Receive (TXRX) system provides you with two-way satellite voice/data broadband communications while underway on an ocean-going vessel. This can be used to provide a wide variety of telephone, fax and high speed data applications. Your antenna system can transmit to and receive from any desired Ku-band satellite which has adequate signal coverage in your current geographic area. This input will be distributed to your satellite modem and then to all of your other below decks computer, fax and telephone equipment.

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1.3. System Components

Your Series 09 TXRX system consists of two major groups of equipment, an above-decks group and a below-decks group. Each group is comprised of, but is not limited to, the items listed below. All equipment comprising the Above Decks is incorporated inside the radome assembly and is integrated into a single operational entity. For inputs, this system requires only an unobstructed line-of-sight view to the satellite, Gyro Compass input and AC electrical power.

For more information about these components, refer to the Basic System Information section of this manual.

A. Above-Decks Equipment (ADE) Group

1. Stabilized antenna pedestal
2. Antenna Reflector
3. Feed Assembly with LNB(s)
4. Co-Pol LNB
5. Codan 8W Ku-Band Solid State Block Up-Converter (LBUC)
6. Radome Assembly

B. Below-Decks Equipment Group

7. Antenna Control Unit
8. Terminal Mounting Strip Assembly.
9. Customer Furnished Equipment - Satellite Modem and other below decks equipment required for the desired communications purposes (including LAN and VOIP equipment).
10. Appropriate Coax, Ethernet, and telephone cables

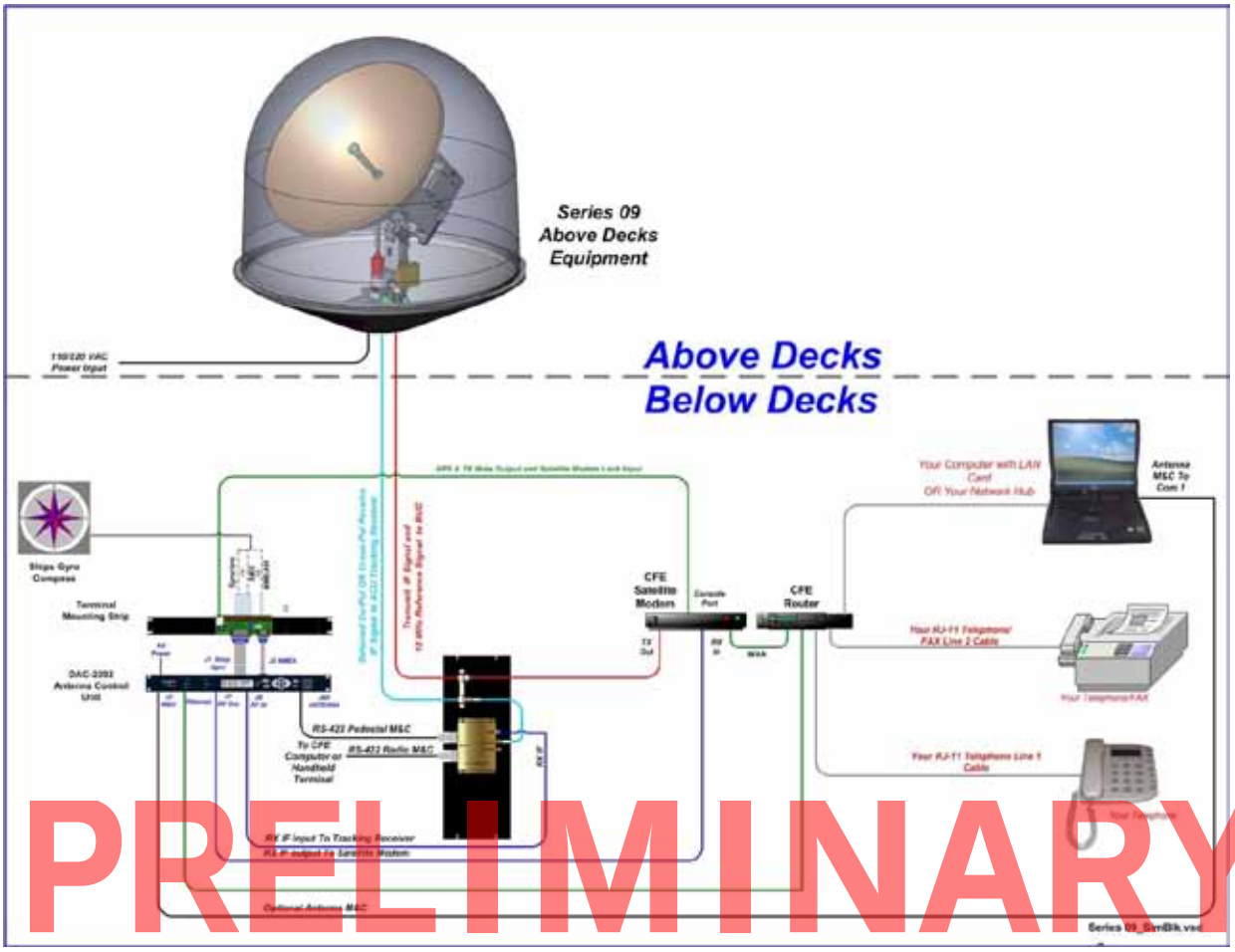

Figure 1-1 Series 09 Simplified Block Diagram

1.4. General scope of this manual

This manual describes the Sea Tel Series 09 Antenna (also called the Above Decks Equipment), its' operation and installation. Refer to the manual provided with your Antenna Control Unit for its' installation and operating instructions.

1.5. Quick Overview of contents

The information in this manual is organized into chapters. Operation, basic system information, installation, setup, functional testing, maintenance, specifications and drawings relating to this Antenna are all contained in this manual

2. Operation

Operation of your system is accomplished from the DAC-2202 Antenna Control Unit (ACU). Refer to the operation section of the DAC-2202 Antenna Control Unit manual.

2.1. System Power-up

Turn the Power switch on rear panel of the Antenna Control Unit (ACU) ON.

2.2. Antenna Initialization

A functional operation check can be made on the antenna stabilization system by observing its behavior during the 3 phases of initialization.

Turn the pedestal power supply ON. This will release the elevation and cross-level bakes and the PCU will initialize the stabilized portion of the mass in the following phases:

1. Elevation axis activates - Input from the LV axis sensors are used to drive the Elevation of the equipment frame and dish to an elevation angle of 45.0 degrees.
2. Cross-Level axis activates - Input from the CL axis sensors are used to drive cross-level of the equipment frame to bring the cross-level beam to level.
3. Azimuth axis activates - Antenna drives clockwise in azimuth until the “Home Flag” signal is produced. This signal is produced when the home switch sensor is in close proximity to the metal home tab mounted under the power ring. An yellow LED in the back of the home switch sensor flashes when the metal home tab is first sensed.

This completes the phases of initialization. At this time the antenna elevation should 45.0 degrees and Relative azimuth should be at home flag (typically this is in-line with the bow of the ship). The PCU will keep the antenna actively stabilized at its current azimuth and elevation pointing angle

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If any of these steps fail, or the Antenna Control Unit reports model number as "xx09" re-configure the PCU as described in section the Setup section of this manual. If initialization still fails, refer to the troubleshooting section of this manual.

2.3. Antenna Stabilization

After initialization has completed, real-time stabilization of the antenna is an automatic function of the PCU.

2.4. Stabilized Pedestal Assembly Operation

Operation of the stabilized antenna Pedestal Control Unit (PCU) is accomplished remotely by the Antenna Control Unit (ACU). Refer to the Operation section of the Antenna Control Unit manual for more specific operation details. There are no other operating instructions applicable to the pedestal assembly by itself.

2.5. Tracking Operation

Tracking optimizes the antenna pointing, in very fine step increments, to maximize the level of the satellite signal being received. The mode of tracking used in this antenna is a variation of Conical Scanning called DishScan. Tracking is controlled by the ACU. You can toggle Tracking ON/OFF from the ACU.

DishScan continuously drives the antenna in a very small circular pattern at 60 RPM. The ACU evaluates the received signal throughout each rotation to determine where the strongest signal level is (Up, Right, Down or Left) and then issues the appropriate Azimuth and/or Elevation steps to move the antenna toward where stronger signal is.

The pedestal cannot control tracking. Refer to the ACU manual for more Tracking information.

2.6. Antenna Polarization Operation

Linear feeds are equipped with a polarization motor and potentiometer feedback and are controlled from the Antenna Control Unit. Circular feeds do NOT require polarization adjustment.

Auto-Polarization mode is the default polarization mode of operation from the ACU. Polarization may be operated manually from the ACU. Refer to the Antenna Control Unit manual (POL TYPE parameter) for more operation information.

2.7. Low Noise Block Converter Operation/Selection:

There are three controls applicable to the LNB's installed on this system; 1 operational voltage selection, 2 operational tone control and selection of Co-Pol ***OR*** Cross-Pol Receive IF. Voltage and Tone, used to select the frequency band of the LNB, are supplied to the LNB which has been selected by the Co-Pol/Cross-Pol switch. DC voltage is supplied by the pedestal modem and Tone is supplied by the tone generator. The Band and Polarity of the Receive IF is selected by the Tracking Band setting in the ACU. Your service provider will determine which frequency band and whether to use Co-Pol or Cross-Pol for normal operation. The chart below may be used to determine what tracking band setting to utilize and ***only*** applies when the "TrackDisp" parameter is set to 0130 (refer to chapter 5 for detailed information on this parameter).

Tracking Band Setting	Tone, LNB Voltage & Switch state	Receive IF Polarity
Xp B1	Tone OFF, Volt 13, Aux 0	Cross-Pol Band 1
Xp B2	Tone ON, Volt 13, Aux 0	Cross-Pol Band 2
Xp B3	Tone OFF, Volt 18, Aux 0	Cross-Pol Band 3
Xp B4	Tone ON, Volt 18, Aux 0	Cross-Pol Band 4
Cp B1	Tone OFF, Volt 13, Aux 1	Co-Pol Band 1
Cp B2	Tone ON, Volt 13, Aux 1	Co-Pol Band 2
Cp B3	Tone OFF, Volt 18, Aux 1	Co-Pol Band 3
Cp B4	Tone ON, Volt 18, Aux 1	Co-Pol Band 4

2.8. RF Equipment

The RF Equipment is not operated or controlled by the antenna pedestal or Antenna Control Unit. Refer to the vendor supplied manuals for the RF Equipment and Satellite Modem which were provided with your system.

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2.9. FCC TX Mute Function

FCC TX Mute function provides a transmit inhibit, or mute, signal to the Satellite Modem to disable transmit whenever the antenna is blocked, searching, targeting, unwrapping, or is mispointed >0.5 degrees from peak satellite position. This functionality is provided by software in the ACU & PCU. Hardware wiring connection between the ACU Terminal Mounting Strip and the Satellite Modem and proper setup of the ACU "SYSTEM TYPE" parameter are also required for this function to operate properly.

After being properly installed and setup correctly the FCC TX Mute function operation is automatic, therefore, requires no operator intervention. Refer to the Installation and Setup chapters in this manual and in your Antenna Control Unit manual.

2.10. Radome Assembly Operation

When operating the system it is necessary that the radome access hatch (and/or side door) be closed and secured in place at all times. This prevents rain, salt water and wind from entering the radome. Water and excessive condensation promote rust & corrosion of the antenna pedestal. Wind gusts will disturb the antenna pointing.

There are no other operating instructions applicable to the radome assembly by itself.

3. Installation

Your antenna pedestal comes completely assembled in its radome. This section contains instructions for unpacking, final assembly and installation of the equipment. It is highly recommended that installation of the system be performed by trained technicians.

3.1. Unpacking and Inspection

Exercise caution when unpacking the equipment. Carefully inspect the radome surface for evidence of shipping damage.

3.2. Site Selection Aboard Ship

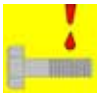
The radome assembly should be installed at a location aboard ship where:

- The antenna has a clear line-of-sight to as much of the sky (horizon to zenith at all bearings) as is practical.
- The antenna is a minimum of 15 Feet from the ship's Radar, further away if they are high power Radar arrays.
- The antenna is not mounted on the same plane as the ship's Radar, so that it is not directly in the Radar beam path.
- The antenna is a minimum of 15 Feet from high power short wave transmitting antennas.
- The Above Decks Equipment (ADE) and the Below Decks Equipment (BDE) should be positioned as close to one another as possible. This is necessary to reduce the losses associated with long cable runs.
- The mounting location is robust enough that it will not flex or sway in ships motion and be sufficiently well re-enforced to prevent flex and vibration forces from being exerted on the antenna and radome.
- If the radome is to be mounted on a raised pedestal, it ***MUST*** have adequate gussets, or be well guyed, to prevent flexing or swaying in ships motion. Robust,.
- This mounting platform must also be robust enough to withstand the forces exerted by full rated wind load on the radome.

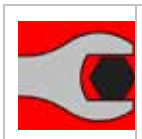
PRELIMINARY

If these conditions cannot be entirely satisfied, the site selection will inevitably be a “best” compromise between the various considerations.

3.3. Assembly Notes and Warnings



NOTE: **Unless otherwise indicated, all nuts and bolts should be assembled with Loctite 271 or its equivalent.**

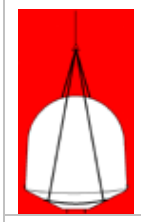


WARNING: **Assure that all nut & bolt assemblies are tightened according the tightening torque values listed below:**

Bolt Size	Inch Pounds
1/4-20	75
5/l6-18	132
3/8-16	236
1/2-13	517

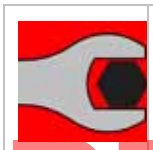
3.4. Installing the ADE

The antenna pedestal is shipped completely assembled in its radome.



***WARNING**: Hoisting with other than a webbed four-part sling may result in catastrophic crushing of the radome. Refer to the specifications and drawings for the fully assembled weight of your model Antenna/Radome and assure that equipment used to lift/hoist this system is rated accordingly.*

***CAUTION**: The antenna/radome assembly is very light for its size and is subject to large swaying motions if hoisted under windy conditions. Always ensure that tag lines, attached to the radome base frame, are attended while the antenna assembly is being hoisted to its assigned location aboard ship.*



***WARNING**: Assure that all nut & bolt assemblies are tightened according the tightening torque values listed below:*

Bolt Size	Inch Pounds
1/4-20	75
5/l6-18	132
3/8-16	236
1/2-13	517

PRELIMINARY

3.4.1. Preparing The Single Piece 80.8" Radome Assembly

1. The antenna pedestal is shipped completely assembled in its 80.8" single piece radome.
2. Remove the shipping hold-down bolts which mount the ADE to its' pallet.
3. Attach a four-part lifting sling to the four lifting eyes in the base of the radome and lift the radome assembly free of its shipping pallet. Place the radome assembly on temporary support blocks at least 22 inches high.

4. Loosely assemble the radome base frame's eight legs and eleven braces as shown in the Frame Assembly drawing using the Radome Base provided. Insure that a split washer is hardware used under each nut. When assembled, tighten all hardware.
5. Using the four-part lifting sling, and with a tag line attached to the radome base frame, hoist the antenna assembly to its assigned location aboard ship by means of a suitably-sized crane or derrick.
6. The radome assembly should be positioned with the BOW marker aligned as close as possible to the ship centerline. Any variation from actual alignment can be compensated with the AZIMUTH TRIM adjustment in the ACU, so precise alignment is not required.

7. Bolt or weld the legs of the radome base frame directly to the ship's deck. If the deck is uneven or not level, weld clips to the deck and attach them to the legs of the radome base frame. When completed the radome base must be level.
8. Disconnect the lifting sling from the four lifting eyes in the base of the radome.

3.4.2. Antenna Pedestal Mechanical Checklist

1. Open the radome hatch (if you didn't previously) and enter part way into the radome.
2. Inspect the pedestal assembly and reflector for signs of shipping damage.
3. Remove the tiewrap(s) and web strap(s) that are restraining the pedestal. ***Save the web strap shipping restraints so that they can be re-used to restrain the antenna if the system will be un-energized while the ship is underway.***
4. Check to assure that the antenna moves freely in azimuth without hitting any area of the interior of the radome or fouling in any of the cables in the base of the radome. Elevation and cross are held by the brakes built into those motors.
5. Check that all pedestal wiring and cabling is properly dressed and clamped in place.
6. Assure that the radome hatch is closed and secured when entry into the radome is no longer required.

3.5. Cable Installation

3.5.1. Shipboard Cable Installation

CAUTION: Rough handling, tight bending, kinking, crushing and other careless handling of the cables and their connectors can cause severe damage.

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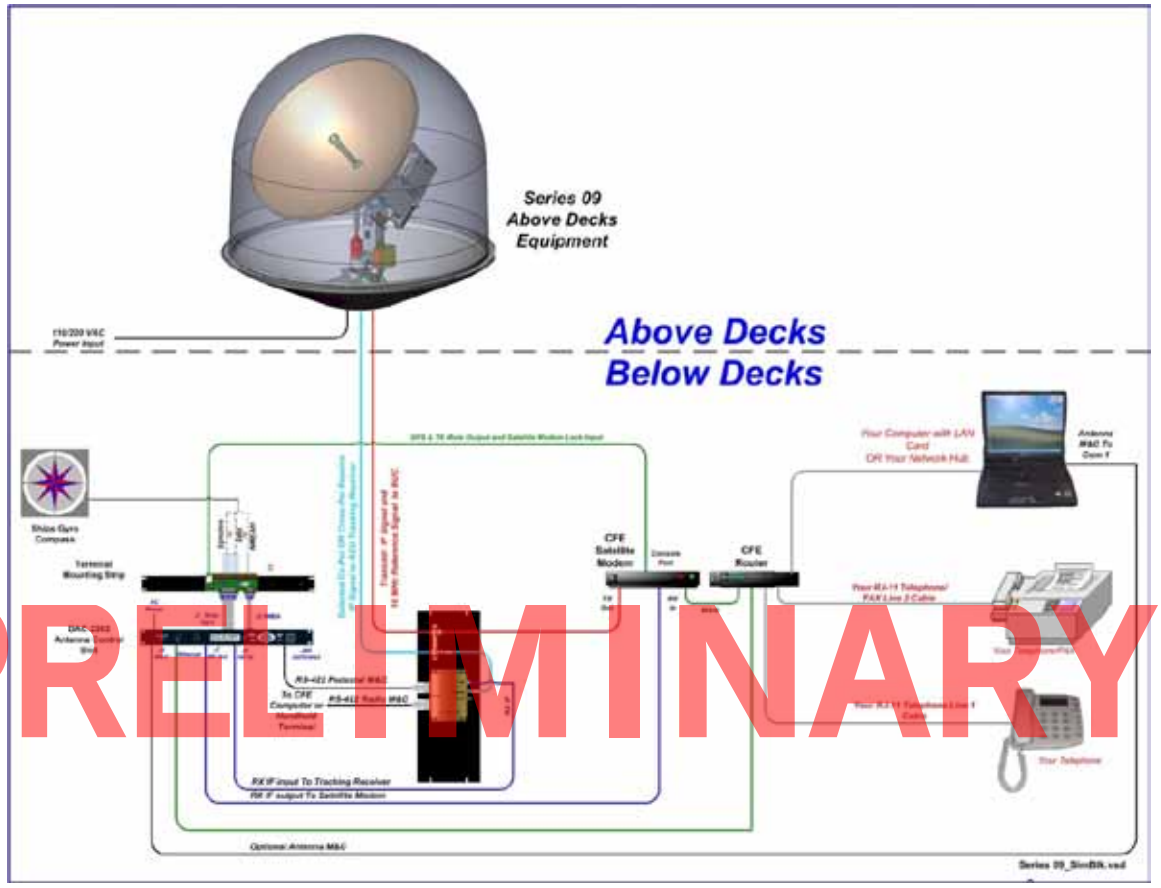
The cables must be routed from the above-decks equipment group through the deck and through various ship spaces to the vicinity of the below-decks equipment group. When pulling the cables in place, avoid sharp bends, kinking, and the use of excessive force. After placement, seal the deck penetration gland and tie the cables securely in place.

3.6. Below Decks Equipment.

3.6.1. System Configuration



PRELIMINARY

Figure 3-1 Series 09 Simplified Block Diagram

3.6.2. Installing the Below Deck Equipment

1. Install the ACU, Terminal Mounting Strip and Multiplexer Panel in your standard 19" Equipment Rack.
2. Connect this equipment as shown in the System Block Diagram.
3. Install and connect your other Below Decks Equipment (ie, Satellite Modem, telephone and computer equipment).
4. Connect the two coaxes from the Radome Assembly to the BDE Rack.
5. Connect Ships Gyro Compass input to the Terminal Mounting Strip on the rear of the BDE Rack.
6. Connect TMS Transmit mute and positive Satellite ID function lines to Satellite modem.
7. Connect the appropriate power cable into the receptacle of the racks power strip.
8. Plug the power cord into a suitable 110, or 220, VAC UPS or AC power outlet.

3.6.3. Antenna Control Unit Connections

The DAC-2202 ACU is installed in a BDE Rack and is one rack unit high. It includes a Terminal Mounting Strip mounted on the rear of the rack which is also a one rack unit high plate.

3.6.4. Terminal Mounting Strip Connections

You will connect you Ships Gyro Compass input to the appropriate screw terminals on these strip.

3.6.5. Control Cable Connections

The Serial Control Cable is connected from the Base Multiplexer to J4A on the DAC-2202.

3.6.6. NMEA GPS, Modem Lock & TX Inhibit Output Cable Connections

The cable connection from TB 4 on the Terminal Mounting Strip to the Modem is pre-connected at the factory. This connection can provide the following connections between the ACU and the satellite modem:

- NMEA GPS output (allows the modem to adjust its link timing) ***GPS string also available via the Ethernet port
- Modem Lock output from the modem provides a logic input to the ACU to identify when it is on the correct satellite.
- A transmit inhibit output from the ACU will mute the modem transmit when the antenna is mis-pointed 0.5 degrees. This connection is ***MANDATORY*** to comply with new FCC Order 04-286 and WRC-03 Resolution 902.

3.6.7. Ships Gyro Compass Connections

Connect the cable from the ship's gyro compass repeater to TB1 or TB3 of the Terminal mounting strip. Use TB1 for a Step-By-Step gyro compass and match the connections to COM, A, B and C. Use TB3 for a Synchro gyro compass and match the connections to R1, R2, S1, S2 and S3.

3.6.8. IF Cable Connections

Attach the connectors on the TX and RX IF cables from above decks equipment to the BDE Rack. Attach the TX cable to the Satellite Modem "TX" connection. Attach the RX cable to the Base Multiplexer panel RX connector. Attach the RX IF Output cable from the Base Multiplexer to the J6 RF IN connector on the rear of the ACU. Attach the other RX IF cable from J7 RF OUT connector on the rear of the ACU to the Satellite Modem "RX" connection.

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3.6.9. AGC Tracking Input Connections

The RX IF cable connection to the J6 "RF IN" connector on the rear of the ACU provides the satellite signal input for the Antenna Control Unit to use to track the satellite.

3.7. Broadband Connections Below Decks

Refer to System Block Diagram for the Series 03 Ku-Band TX/RX System for connection information.

3.8. Set-up & Configuration

Refer to the next section of this manual for set-up and configuration of the components in this system.

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4. Set-up & Configuration

The components in the system will have been configured with IP Addresses at the factory. The Front Title Page of this manual has a list of recorded IP address information, serial number information and Modem software version.

In the paragraphs below you will verify the configuration of these components, which will also verify that each of them are communicating. If one of the components has been replaced, it will have to be configured correctly to properly operate as part of this system.

Contact Sea Tel for the Internet Service Provider (ISP) Network Operation Center (NOC) ASSIGNED IP address, SubNet Mask and the Primary & Secondary DNS addresses if they have not been previously provided to you, or if you have changed providers.

4.1. Operator Settings

Refer to the Operation chapter of this manual to set the Ship information. Latitude and Longitude should automatically update when the GPS engine mounted above decks triangulates an accurate location, but you may enter this information manually to begin. If your gyro source is providing Heading information in any format other than NMEA-0183 format, you will have to enter in the initial Ship's Heading position, the Gyro Compass will then keep the ACU updated.

Set the Satellite information, for the satellite you will be using. The receiver settings are especially important. At this point you should be able to target the desired satellite. Continue with the setup steps below to optimize the parameters for your installation.

4.2. Optimizing Targeting

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First, assure that all of your Ship & Satellite settings in the ACU are correct. Target the desired satellite, immediately turn Tracking OFF, and record the Azimuth and Elevation positions in the "***ANTENNA***" display of the ACU (these are the **Calculated** positions). Turn Tracking ON, allow the antenna to "Search" for the targeted satellite and assure that it has acquired (and peaks up on) the satellite that you targeted. Allow several minutes for the antenna to "peak" on the signal, and then record the Azimuth and Elevation positions while peaked on satellite (these are the **Peak** positions). Again, assure that it has acquired the satellite that you targeted!

Subtract the Peak Positions from the Calculated Positions to determine the amount of Trim which is required. Refer to the ACU Setup information to key in the required value of Elevation Trim. Continue with Azimuth trim, then re-target the satellite several times to verify that targeting is now driving the antenna to a position that is within +/- 1.0 degrees of where the satellite signal is located.

EXAMPLE: The ACU targets to an Elevation position of 30.0 degrees and an Azimuth position of 180.2 (Calculated), you find that Peak Elevation while ON your desired satellite is 31.5 degrees and Peak Azimuth is 178.0. You would enter an EL TRIM value of –1.5 degrees and an AZ TRIM of +2.2 degrees. After these trims values had been set, your peak ***on satellite*** Azimuth and Elevation displays would be very near 180.2 and 30.0 respectively.

4.3. Optimizing Auto-Polarization TX/RX

If your system is fitted with a circular feed you do not need to optimize the polarity angle and can skip this procedure. This procedure optimizes the linear polarization of the feed. Verify that tracking is ON and that the antenna is peaked on your targeted satellite (targeting calculates the azimuth, elevation and polarization angles). Assure that you are in Auto-Pol mode (POL TYPE parameter in the ACU is set to 0072) and set your satellite modem (or spectrum analyzer) to view its signal level display. Go to the TX POLARITY parameter in the Setup menu of the ACU and set this parameter to your assigned Transmit polarity (Horizontal or Vertical). Go to the POL OFFSET parameter in the Setup menu of the ACU.

Default setting is 0040 and may be incremented, or decremented, to adjust polarization while in Auto-Pol mode. Each increment equals one degree of polarization rotation (0048 = +8 degrees), decrement below 40 for minus polarization (0032 = -8 degrees). Press the UP arrow to increment or the DOWN arrow to decrement the value and then hit the ENTER key to adjust the feed to the new value. *Allow 30 to 60 seconds between increments or decrements to allow time for feed assembly to drive to new position*

During commissioning, under guidance from the network operation center, you will be adjusting to minimize the effect of your transmission on the opposite polarization which maximizes your Cross-Pol isolation. Contact your satellite provider to help you (over the phone) to optimize the polarity angle for maximum Cross-Pol isolation (this optimizes

your transmit polarity and is much more accurate than you trying to optimize your receive polarity). Save your new TX POLARITY and POL OFFSET values (refer to Save New Parameters in your ACU manual).

4.4. Calibrating Relative Antenna Position (Home Flag Offset)

During initialization, azimuth drives the CW antenna until the Home Switch is contacted, which "presets" the relative position counter to the value stored in the Home Flag Offset. This assures that the encoder input increments/decrements from this initialization value so that the encoder does not have to be precision aligned.

The Home Switch is a hall sensor which is actuated by a magnet mounted on the azimuth driven sprocket, which produces the "Home Flag" signal.

The Home Flag Offset is a value saved in NVRam (Non-Volatile RAM) in the PCU. This value is the relative position of the antenna when the home switch is engaged. Presetting the counter to this value assures that when the antenna is pointed in-line with the bow of the ship the counter will read 000.0 **Relative** (360.0 = 000.0).

In most cases when the antenna stops at the home flag, it will be pointed in-line with the Bow of the ship. In these cases Home Flag Offset (HFO) should be set to zero. When "Optimizing Targeting" small variations (up to +/- 5.0 degrees) in Azimuth can be corrected using If it AZ TRIM as described in the Optimizing Targeting procedure above.

Large variations in Azimuth position indicate that the Relative position is incorrect and should be "calibrated" using the correct HFO value instead of an Azimuth Trim offset. This is especially true if sector blockage mapping is used.

If the antenna stops at the home flag, but it is NOT pointed in-line with the Bow of the ship, it is important to assure that the antennas ***actual*** position (relative to the bow of the ship) is the value that gets "preset" into the Relative position counter. By saving the antennas ***actual*** Relative position when at the home flag into HFO, you have calibrated the antenna to the ship.

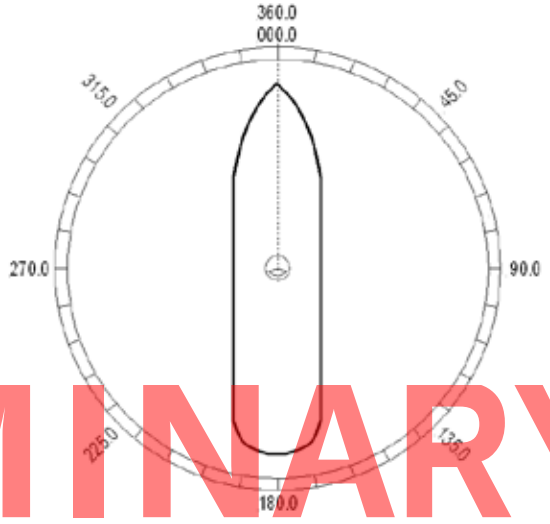

Figure 4-1 Antenna stops In-line with Bow

PRELIMINARY

4.4.1. To Calculate HFO:

If Targeting has been optimized by entering a large value of AZ TRIM; First, verify that you are able to repeatably accurately target a desired satellite (within +/- 1.0 degrees). Then you can use the AZ TRIM value to calculate the value of HFO you should use (so you can set AZ TRIM to zero). AZ Trim is entered as the number of ***tenths*** of degrees. You will have to convert the AZ TRIM value to the nearest **whole** degree (round up or down as needed). Calculated HFO value is also rounded to the nearest whole number.

If AZ TRIM was a **plus** value: HFO = (TRIM / 360) x 255 Example: AZ TRIM was 0200 (plus 20 degrees). HFO = (20/360) x 255 = (0.0556) x 255 = 14.16 round off to 14.

If AZ TRIM was a **negative** value: HFO = ((360-TRIM) / 360)) x 255 Example: AZ TRIM = -0450 (minus 45 degrees). HFO = ((360 – 45) / 360)) x 255 = (315 / 360) x 255 = 0.875 x 255 = 223.125 round of to 223.

If Targeting has NOT been optimized, allow the antenna to initialize to its home flag position. Visually compare the antennas pointing to the bow-line of the ship (parallel to the Bow). Note the antennas position relative to the Bow. If it appears to be very close to being parallel to the bow, HFO will probably not be needed and you can proceed with Optimizing Targeting. If it is NOT close [initialization was driving the azimuth CW], note if the antenna appears to have stopped before it got to the Bow or if it went past the Bow. You may be able to guess an approximate amount of how many degrees the antenna is from the bow. This is only intended to help you initially find the satellite (which direction you will have to drive and approximately how far you will have to drive). Refer, in general terms, to the Optimizing Targeting procedure.

If the antenna stopped before it got to the bow-line; When you initially target a satellite, the antenna will also stop prior to the satellite position, so you that will have to drive the Azimuth of the antenna UP to actually find the satellite. Using the same basic procedure as in the Optimizing Targeting paragraph, target the satellite and record the "Calculated" Azimuth position that the antenna was driven to. Drive UP until you find the satellite, positively identify that you are on **the satellite** you targeted and allow tracking to peak the antenna position. Record the "Peak" Azimuth position. Subtract the "Peak" position from the "Calculated" position to determine the number of degrees of AZ TRIM that would be required.

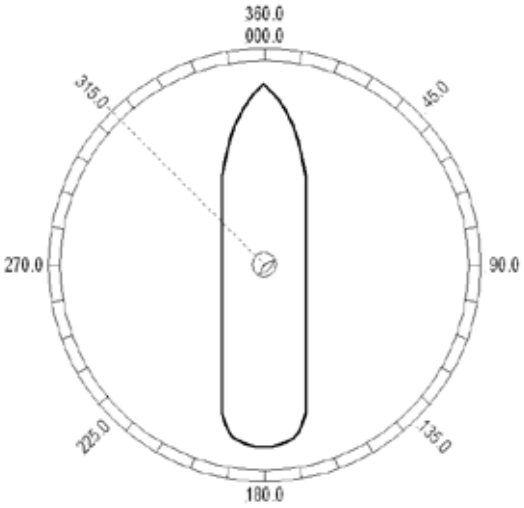

Figure 4-2 Antenna stopped before the Bow

Example: In this new installation, I target my desired satellite and record the Calculated Azimuth to be 180.5. I drive UP and finally find my desired satellite at a Peak Azimuth of 227.0 degrees. I subtract Peak from Calculated and difference to be –46.5 degrees, therefore the actual Relative position that needs to be preset into the counter when the antenna is at the Home Flag is 313.5. HFO = ((360-46.5) / 360)) x 255 = (313.5 / 360) x 255 = 0.87 x 255 = 222.06 which I round down to 222.

If the antenna went past the bow-line; When you initially target a satellite, the antenna will also go past the satellite position, so that you will have to drive the Azimuth of the antenna DOWN to actually find the satellite. Using the same basic procedure as in the Optimizing Targeting paragraph, target the satellite and record the "Calculated" Azimuth position that the antenna was driven to. Drive DOWN until you find the satellite, positively identify that you are on **the satellite** you targeted and allow tracking to peak the antenna position. Record the "Peak" Azimuth position. Subtract the "Peak" position from the "Calculated" position to determine the number of degrees of AZ TRIM that would be required. . Refer to the calculations above to determine the HFO you should use for this antenna.

PRELIMINARY

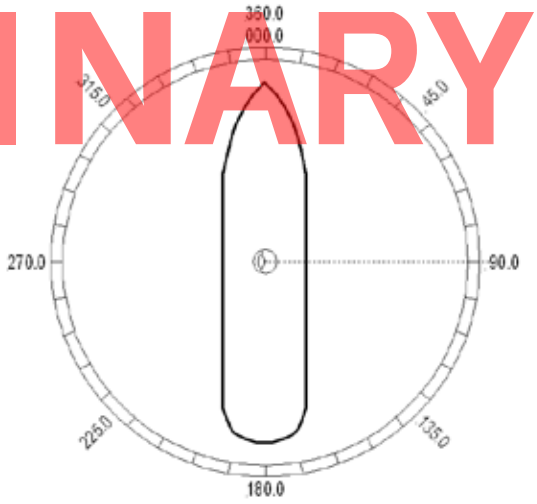

Figure 4-3 Antenna stops past the Bow

Example: In this new installation, I target my desired satellite and record the Calculated Azimuth to be 180.0. I drive DOWN and finally find my desired satellite at a Peak Azimuth of 90.0 degrees. I subtract Peak from Calculated and difference to be +90.0 degrees, therefore the actual Relative position that needs to be preset into the counter when the antenna is at the Home Flag is 90.0. HFO = ((90.0) / 360)) x 255 = 0.25 x 255 = 63.75 which I round up to 64.

4.4.2. To Enter the HFO value:

To enter the calculated HFO value, press & hold both LEFT and RIGHT arrows for six seconds to enter the parameter menu at the EL TRIM parameter window. Press DOWN arrow key numerous times (about 21) until you have selected the REMOTE COMMAND window.

In the REMOTE COMMAND window, press the LEFT arrow key until you have underscored the left most character in the displayed value (ie the A in "A0000"). Use the UP/DOWN arrow keys to increment/decrement the underscored character until it is upper case **N** ("N0000" should appear in the command window). Press the RIGHT arrow key to move the cursor under the most significant digit, then use the UP arrow key to increment it to a value of 6 (the display is now "N6000"). Set the three digits to the right of the 6 to the three digit HFO value from 000 to 255 (corresponding to 0 to 360 degrees) that you calculated above. Use the LEFT/RIGHT keys to underscore the desired digit(s) then use the UP/DONW arrow keys to increment/decrement the underscored value. When you have finished editing the display value, press ENTER to send the HFO value command to the PCU (but it is not save yet).

If you want to find out what the ***current*** HFO value is key in N6999 and hit **ENTER.**

When completed, you must save the desired HFO value. Press ENTER several times to select the REMOTE PARAMETERS display. Press the LEFT or RIGHT arrow key to enter writing mode and then press the ENTER to save the HFO value in the PCUs NVRAM.

EXAMPLE: In the "Antenna stopped before the Bow" example above, the HFO calculated was 222. To enter this value:

1. Set the Remote Command value to "**N6222**".
2. Press **ENTER** to send this HFO to the PCU. The display should now show "N0222".
3. When completed, you must save the desired HFO value. Press **ENTER** several times to select the **REMOTE PARAMETERS** display. Press the **LEFT** or **RIGHT** arrow key to enter writing mode and then press the **ENTER** to save the HFO value in the PCUs NVRAM.

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You have to drive the antenna CW in azimuth until the home switch is actuated, or re-initialize the antenna to begin using the new HFO value you have entered and saved. To re-initialize the antenna from the REMOTE COMMAND window of the ACU;

4. Press **UP** arrow key several times to return to the **REMOTE COMMAND** display.
5. Press the **LEFT** or **RIGHT** arrow key to enter edit mode. Use the **LEFT/RIGHT** and **UP/DOWN** arrow keys to set the character and digits to "**^0090**" and then press the **ENTER** key.

This resets the PCU on the antenna. The antenna will reinitialize with this command (Performs a similar function as a power reset of the antenna) and the new home flag offset value will be used to calibrate the Relative position of the antenna.

4.5. Radiation Hazard and Blockage Mapping (AZ LIMIT parameters)

This system may be programmed with relative azimuth and elevation sectors (zones) where blockage exists or where transmit power would endanger personnel who are frequently in that area.

Refer to your ACU Manual for instructions on programming of these zones.

4.6. TX Polarity Setup

With the feed in the center of its polarization adjustment range, observe the transmit port polarity (vector across the short dimension of the transmit wave-guide).

If the transmit polarity in the center of the travel range is vertical, use the following entries:

2 Vertical Transmit Polarity

4 Horizontal Transmit Polarity

If the Transmit polarity in the center of the travel range is horizontal, use the following entries:

2 Horizontal Transmit Polarity

4 Vertical Transmit Polarity

4.7. TRACK DISP

This parameter set the selections that the user will see in the Tracking - Band Selection menu. Band Selection ***must*** be set to the appropriate selection for Tracking to operate properly.

The Band selection controls the ***local*** logic output state of SW1 output terminal on the Terminal Mounting Strip PCB, the LNB voltage supplied by the pedestal modem, and the ***remote*** Aux Status (Co-Pol/Cross-Pol receive IF Coax switch) on the antenna pedestal.

The factory default selections and SW1 status for your antenna is listed in the following table:

TRACK DISP Setting	Displayed band selection	ADE Band Select Parameters (Tone, Voltage & Aux Status)	TMS SW1 Status
0130	Xp B1	Tone OFF, Volt 13, Aux 0	Open
	Xp B2	Tone ON, Volt 13, Aux 0	Open
	Xp B3	Tone OFF, Volt 18, Aux 0	Short
	Xp B4	Tone ON, Volt 18, Aux 0	Short
	Cp B1	Tone OFF, Volt 13, Aux 1	Open
	Cp B2	Tone ON, Volt 13, Aux 1	Open
	Cp B3	Tone OFF, Volt 18, Aux 1	Short
	Cp B4	Tone ON, Volt 18, Aux 1	Short

When the SW1 output is shorted to ground a current sink of 0.5 amps ***max*** is provided to control below decks band selection tone generators or coax switches. When SW1 output is open it is a floating output.

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4.8. Default Setup Parameters

The following table shows the factory default parameters for the DAC-2202 Antenna Control Unit interfaced to a Series 09 Antenna PCU. When the installation & setup of your system is finished you can record the "optimized" settings for your system in the "My Parameters" column. Also refer to the Antenna Control Unit Manual for more in-depth information each of the individual parameters and how to enter, or change, the parameters.

PARAMETER	Ku DishScan	My Parameters
EL TRIM	0	
AZ TRIM	0	
AUTO THRES	100	
EL STEP SIZE	0	
AZ STEP SIZE	0	
STEP INTEGRAL	0	
SEARCH INC	10	
SEARCH LIMIT	100	
SEARCH DELAY	30	
SWEEP INC	0000	
SYSTEM TYPE	7 *	
GYRO TYPE	2 (NMEA/SBS)	
POL TYPE	72	
POL OFFSET	40	
POL SCALE	90	
AZ LIMIT 1	0	
AZ LIMIT 2	0	
EL LIMIT 12	0	
AZ LIMIT 3	0	
AZ LIMIT 4	0	
EL LIMIT 34	0	
AZ LIMIT 5	0	
AZ LIMIT 6	0	
EL LIMIT 56	0	
5v OFFSET	0	
5V SCALE	0	
TX POLARITY	2 (Horizontal TX)	
TRACK DISP	130	

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**** Modem Lock input & Modem TX Mute output functions ARE set for the i-Direct Passport II, 3100 or 5100 Series modems, refer to SYSTEM TYPE parameter information.***

5. Functional Testing

If not already ON, Turn ON the Power switch on the front panel of the ACU.

5.1. ACU / Antenna System Check

1. Press RESET on the ACU front panel to initialize the system. Verify the display shows "SEA TEL INC - MASTER" and the ACU software version number. Wait 10 seconds for the display to change to "SEA TEL INC - REMOTE" and the PCU software version number.
2. If the display shows "REMOTE INITIALIZING" wait for approximately 2 minutes for the antenna to complete initialization and report the Antenna Model and PCU software version. If "REMOTE NOT RESPONDING" is displayed, refer to the Troubleshooting Section of this manual.
3. Press the **NEXT** key repeatedly to display the ***Ship***, ***Satellite***, ***Antenna*** and ***Status*** menu displays. This verifies that the displays change in the correct response to the keys.

5.2. Latitude/Longitude Auto-Update check

This verifies that the GPS position information is automatically updating..

1. Press the **NEXT** key repeatedly to display the ***Ship*** menu. Press **ENTER** to access edit mode and view the current Latitude value.
2. Press the LEFT arrow key to bring the cursor up under the ones digit, press UP and then hit ENTER. The display should immediately show a latitude value one degree higher, but then will be overwritten within several seconds (back to the previous value) by the GPS engine.

This test does not need to be repeated in the Longitude menu.

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5.3. Ship Heading – Gyro Compass Following Check

This verifies that the Heading display is actually following the Ships Gyro Compass.

1. Press the **NEXT** key repeatedly to display the ***Ship*** menu. If the boat is underway, monitor the Heading value to verify that the display changes in the correct response to the Gyro Compass input (Heading value should always be exactly the same as the Gyro Compass repeater value).
2. If the ship is NOT underway, most ships will turn +/- 1-2 degrees at the pier, monitor the Heading value to verify that the display changes in the correct response to the Gyro Compass input (Heading value should always be exactly the same as the Gyro Compass repeater value).

5.4. Azimuth & Elevation Drive

This verifies that the antenna moves in the correct response to the keys.

1. Press the **NEXT** key several times to display the Antenna menu.
2. Press the **TRACK** key to toggle Tracking OFF. Press the **UP** arrow key repeatedly and verify that the antenna moves up in elevation.
3. Press the **DOWN** arrow key repeatedly and verify that the antenna moves down in elevation.
4. Press the **RIGHT** arrow key repeatedly and verify that the antenna moves up (CW) in azimuth.
5. Press the **LEFT** arrow key repeatedly and verify that the antenna moves down (CCW) in azimuth.

5.5. Four Quadrant Tracking Test

This verifies that the antenna moves in the correct response to the keys, that Tracking is signaling correctly and that the Tracking commands are being carried out (antenna drives to peak).

1. Verify antenna is locked onto and tracking a satellite
2. Press the **NEXT** key several times to display the ***Antenna*** menu.
3. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **UP** arrow key repeatedly to move the antenna up in elevation until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back down in elevation and that the AGC rises to its' previous high value.
4. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **DOWN** arrow key repeatedly to move the antenna down in elevation until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back up in elevation and that the AGC rises to its' previous high value.
5. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **RIGHT** arrow key repeatedly to move the antenna up in azimuth until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back down in azimuth and that the AGC rises to its' previous high value.
6. Note the current peak AGC value. Press the **Tracking** key to toggle Tracking OFF, press the **LEFT** arrow key repeatedly to move the antenna down in azimuth until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back up in azimuth and that the AGC rises to its' previous high value.

5.6. Blockage Simulation Test

Blockage output function is used to modify the behavior of Tracking and Searching when there is a known blockage zone. The ACU provides a contact closure to ground on the SW2 terminal of the Terminal Mounting Strip when the antenna is pointed within any one of the blockage/hazard zones or the system is searching, targeting, unwrapping or is mis-pointed by 0.5 degrees or more (FCC TX Mute function for Transmit/Receive systems ***only***). The contact closure is a transistor switch with a current sinking capability of 0.5 Amp. This logic output control signal is used for:

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- When used as simple "BLOCKED" logic output for a single Sea Tel antenna, this output could be used to light a remote LED and/or sound a buzzer to alert someone that the antenna is blocked, and signal is lost.
- In a "Dual Antenna" installation, this logic output(s) is used to control Dual Antenna Arbitrator panel of coax switches to switch the source inputs to the matrix switch from Antenna "A" to Antenna "B", and vice versa.
- When used as simple "**RF Radiation Hazard**" logic output for a single Sea Tel TX/RX antenna, this output could be used to suppress RF transmissions while the antenna is pointed where people would be harmed by the transmitted microwave RF power output. The SW2 output would be interfaced to the satellite modem to ***disable*** the TX output signal from the Satellite TXRX Modem whenever the antenna is within the RF Radiation Hazard zone(s).
- When used for "**FCC TX Mute**" logic output for a single Sea Tel TX/RX antenna, this output could be used to suppress RF transmissions whenever the antenna is mis-pointed 0.5 degrees or more, is blocked, searching, targeting or unwrapping. The SW2 output would be interfaced to the satellite modem to ***disable/mute*** the TX output signal from the Satellite TX/RX Modem. When the mute condition is due to antenna mis-pointing, it will not ***un-mute*** until the pointing error of the antenna is within 0.2 degrees. The default output is contact closure to ground when the antenna is mis-pointed, therefore provides a **ground** to "Mute" the satellite modem on the SW2 terminal of the Terminal Mounting Strip. If your satellite modem requires an **open** to "Mute", refer to SYSTEM TYPE parameter 16 value to reverse the output logic from the ACU.

To Test the blockage function:

1. Press the NEXT key until you are at the Status menu. Press ENTER to access the Tracking menu.
2. Press the RIGHT arrow key to bring up and move the cursor to the far right. Press the UP arrow to simulate a manual BLOCKED condition. BLOCKED will appear in the Tracking display.
3. Verify that SW2 terminal shorts to ground (or open circuit if you have SYSTEM TYPE configured to reverse the output logic) and that the external alarms actuate OR the Dual Antenna Arbitrator coax switches toggle (if antenna B is not blocked) OR the Satellite Modem TX is disabled/muted.
4. Press the LEFT arrow key and then press the UP arrow key to turn the simulated blocked condition OFF. BLOCKED will disappear from the Tracking display.
5. Verify that SW2 terminal is open circuit (or ground if you have logic reversed) and that the external alarms deactivate OR the Satellite Modem TX is un-muted. The Dual Antenna Arbitrator coax switches should not toggle until you manually block Antenna B ACU.

5.7. Test Broadband Operation

Open you Internet Browser and access several internet sites, email or other functions as you normally would. Operation should be the same as any equivalent service ashore.

5.8. Test Voice Over IP (VOIP) Operation

If Voice Over IP equipment has been provided and services are available from you Internet Service Provider (ISP) you should verify that this equipment and service are functioning properly.

Pick up the Telephone handset which is to be used for Voice Over IP telephone calls. Check for voice mail messages and/or place a telephone call (maybe to have them call you back). It is also important to receive a VOIP telephone call by having someone call you or calling yourself from some other telephone system (shore telephone, cellular or Inmarsat).

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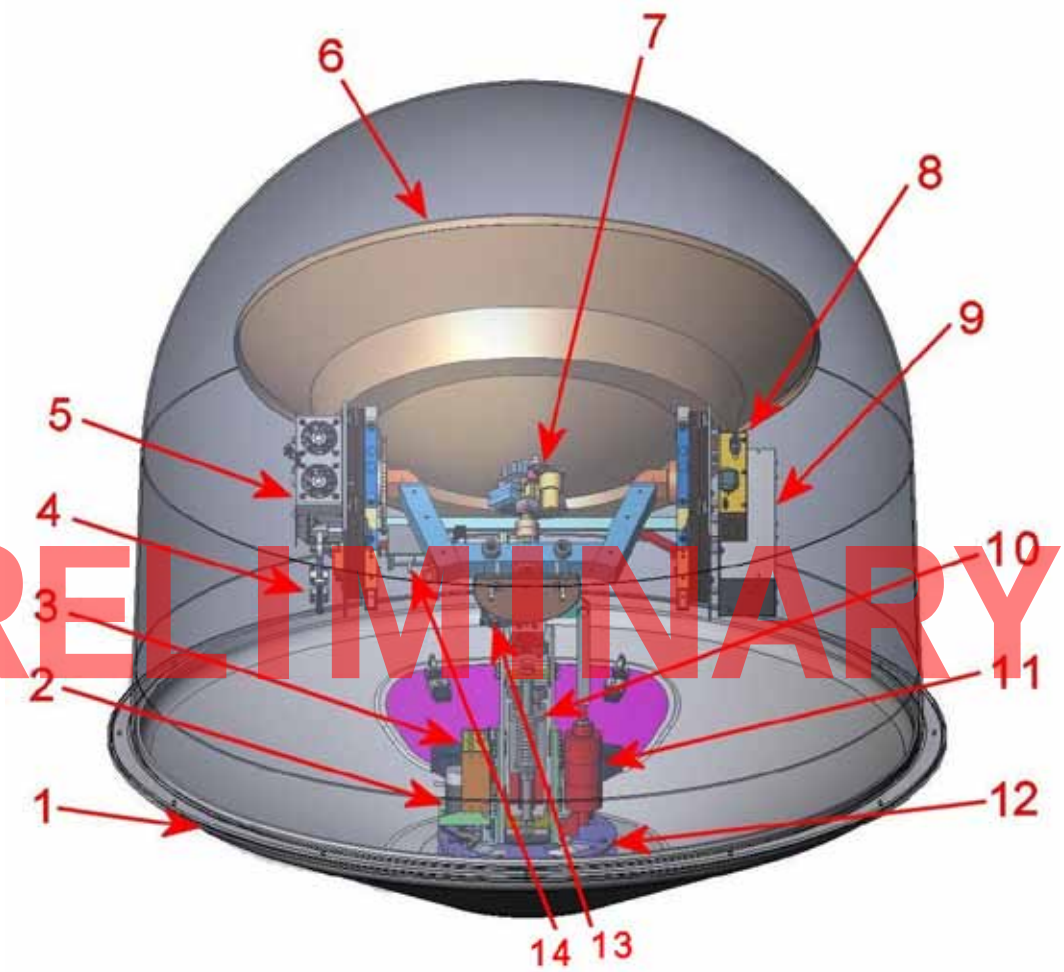
6. Scheduled Preventive Maintenance

6.1. Lowest Replaceable Unit Locations



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1 Radome Base and Top
2 Azimuth Motor
3 Motor Junction Box
4 Waveguide hardware
5 Block Up Converter (BUC)
6 Dish
7 Feed Assembly
8 BUC Power Supply
9 Pedestal Control Unit (PCU)
10 Vertical Isolation Spring
11 Pneumatic Dampener
12 Wire Rope Isolators
13 Cross-Level Motor and Belt
14 Elevation Motor and Belt

6.2. Maintenance Requirements

Notice: Maintenance intervals, checks, inspections, replacement parts, and recommended lubricants as prescribed in this manual are necessary to keep your antenna in good working condition. Any damage caused by failure to follow scheduled maintenance may not be covered by warranty.

6.3. Monthly Operator Checks

Description of Maintenance Operator Check			
1.1.1. Test GPS Auto-Update			
1.1.2. Heading Following			
1.1.3. Check Tracking Receiver Settings			
1.1.4. Four Quadrant Tracking Test			

6.3.1. Test GPS Auto-Update

This verifies that the GPS position information is automatically updating.

1. Press the **NEXT** key repeatedly to display the ***Ship*** menu. Press **ENTER** to access edit mode and view the current Latitude value.
2. Press the LEFT arrow key to bring the cursor up under the ones digit, press UP and then hit ENTER. The display should immediately show a latitude value one degree higher, but then will be overwritten within several seconds (back to the previous value) by the GPS engine.

This test does not need to be repeated in the Longitude menu.

6.3.2. Heading Following

Verify that the value displayed in the **heading** display of the ACU is consistently the same as the value displayed on the ships Gyro Compass as the ship turns. Press the **NEXT** key repeatedly to display the ***Ship*** menu.

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1. If the boat is underway, monitor the Heading value to verify that the display changes in the correct response to the Gyro Compass input (Heading value should always be exactly the same as the Gyro Compass repeater value).
2. If the boat is NOT underway, loosen the mooring lines enough to allow the ship to turn a few degrees at the pier. Monitor the Heading value to verify that the display changes in the correct response to the Gyro Compass input (Heading value should always be exactly the same as the Gyro Compass repeater value).

6.3.3. Check Tracking Receiver Settings

Assure that the following operator settings are correct:

1. Tracking Receiver is tuned to the correct frequency.
2. Tracking Receiver baud rate setting is correct.
3. Tracking Receiver FEC rate setting is correct.
4. Tracking Receiver Volt selection is set correctly.
5. Tracking Receiver Tone selection is set correctly.
6. Tracking Receiver NID setting is correct.

6.3.4. Four Quadrant Tracking Test

This verifies that the antenna moves in the correct response to the keys, that Tracking is signaling correctly and that the Tracking commands are being carried out (antenna drives to peak).

Press the **NEXT** key several times to display the ***Antenna*** menu.

1. Note the current peak ACG value. Press the Tracking key to toggle Tracking OFF, press the UP arrow key repeatedly to move the antenna up in elevation until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back down in elevation and that the AGC rises to its' previous high value.
2. Note the current peak ACG value. Press the Tracking key to toggle Tracking OFF, press the DOWN arrow key repeatedly to move the antenna down in elevation until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back up in elevation and that the AGC rises to its' previous high value.

3. Note the current peak ACG value. Press the Tracking key to toggle Tracking OFF, press the RIGHT arrow key repeatedly to move the antenna up in azimuth until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back down in azimuth and that the AGC rises to its' previous high value.
4. Note the current peak ACG value. Press the Tracking key to toggle Tracking OFF, press the LEFT arrow key repeatedly to move the antenna down in azimuth until AGC falls about 100 counts. Turn Tracking ON and verify that the antenna moves back up in azimuth and that the AGC rises to its' previous high value.

6.4. Monthly Inspections

Regular inspections will assure that your antenna is in peak operating condition. It is possible that your system may not require any service for over a year. However, to maintain peak operational and to extend the life of the equipment, some components should be changed annually. Your Sea Tel authorized dealer has trained service technicians who will perform this work using Sea Tel replacement parts.

Description of Maintenance Operator Check	Inspected by	Inspection date
1.4.1. Radome Visual Inspection		
1.4.2. Pedestal Visual Inspection		
1.4.3. Mechanical Checks		

6.4.1. Monthly Radome Visual Inspection

Conduct a good, thorough, visual inspection of the radome. If any damage is found, notify your dealer immediately.

1. Inspect the outside surface of the radome (top and base) looking for scrapes, cracks, or mars or residue indicating that the gel coat surface has been impacted, or in any other way, damaged. Damage to the sealant coat, or core structure of the radome MUST be properly repaired and re-sealed immediately. If diesel exhaust, or any other residue, is coating the outside of the radome it should be cleaned with mild soapy water to minimize signal loss due caused by these residues.
2. Inspect the inside surface of the radome (top and base) looking for cracks, mars or white fiberglass powder residue due to chafing in the material indicating that it has been impacted or scraped or any other signs of wear or damage.
3. Inspect the flange mating of the radome top and base to insure that the flange is properly sealed to prevent wind, saltwater spray and rain from being able to enter the radome.
4. If condensation, or standing water, is found inside the radome, isolate and seal the leak, and then dry out the radome. Debris clogging the small weep holes in the recessed areas of the radome base may need to be cleaned out to allow standing water to "weep" out. DO NOT DRILL ADDITIONAL HOLES IN THE RADOME BASE.
5. If hardware is found in the recessed areas of the radome base try to ascertain where it may have fallen off From. Notify your dealer immediately.

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6.4.2. Monthly Pedestal Visual Inspection

Conduct a good, thorough, visual inspection of the antenna pedestal.

1. Inspect the AC power conductors inside the breaker box, from the breaker box to the power ring and from the power ring to the AC power terminal strip.

CAUTION: Assure that ships AC power being supplied to that antenna is turned OFF prior to touching any AC Power wiring. Hazardous voltages exist on these wires.

a. Inspect ground wire for damage & proper termination.

b. Assure that the conductors are flexible and that the insulation is not chaffed, brittle or burned. If any damage is found repair or replace the damaged conductors. If damage is due to chaffing, pinching or crushing reroute the new conductors as necessary to prevent future damage.

c. If the damage is at the power ring, replace the power ring (refer to the "replacing the power ring" procedure in the Maintenance section of this chapter),

2. Inspect the Coaxes at the bracket on the radome base, through the pedestal base and at the dual channel rotary joint. Inspect both coaxes to assure that they are flexible and that the insulation is not brittle, chaffed or pinched. If any damage is found repair or replace the damaged coaxes. If damage is due to chaffing, pinching or crushing reroute the new conductors as necessary to prevent future damage. Assure that all the connectors are properly tightened.
3. Inspect the wire-rope isolators - Wire Rope Isolators should not be frayed, completely compressed, or otherwise damaged.- The metal bars on the top & bottom of the wire-rope isolators should not be bent or bowed in any way. If there is any evidence of rust, broken stand(s) of wire or bent bars in any one of the wire-rope isolators, ***notify your dealer immediately*** to obtain replacements and replace all 4 wire rope isolators immediately (refer to the "replacing the wire-rope isolators" procedure in the Maintenance section of this chapter).

Rust from wire rope

Torn wire

4. Inspect vertical isolation linear bearing assembly. Look for metal shavings, plastic dust residue or loose ball bearings on the frame and base plate below the assembly. If any damage is found, notify your dealer immediately.
5. Inspect all harnesses and connections - The harnesses should not be frayed and all the connectors should be properly fastened and retainer screws tightened.
6. Inspect all hardware, checking for any loose hardware, loose assemblies (PCU, Power Supply, BUC or Motor Driver) or counter-weights. .
7. Inspect the Azimuth Motor/Encoder, sprockets, drive chain, chain tensioner and spring. If any of these show signs of rust or corrosion, apply a light coat of "3-in-1" oil using a lit-free cloth on the affected metal surfaces.

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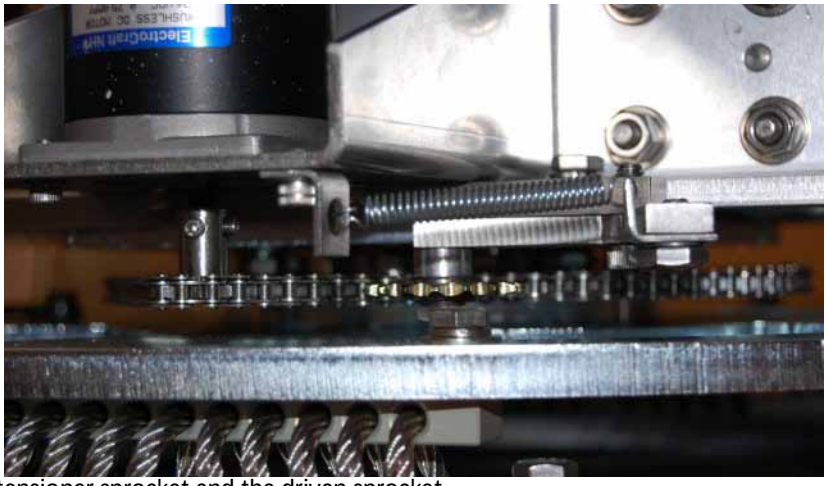
CAUTION: Be EXTREMELY carful rotating the pedestal around while you fingers are in this area to prevent pinching or crushing your fingers in the pedestal assembly.

a. Assure that none of the motor mounting hardware is coming loose. Tighten any loose hardware found.



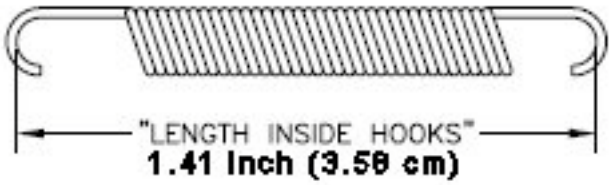
b. Check the motor cable for damage and that the retaining screws are tightened to keep the connector properly terminated .

c. Visually verify that the sprockets are properly aligned so that the chain travels smoothly through the motor sprocket, the chain tensioner sprocket and the driven sprocket.

d. Inspect chain - should not be rusted or corroded, apply light coat of oil on the chain using a lint free cloth.

e. Verify that the ends of the chain tensioner spring are properly hooked in the brackets and that the spring is not stretched. Rotate the chain tensioner away from chain to verify positive spring tension against chain.

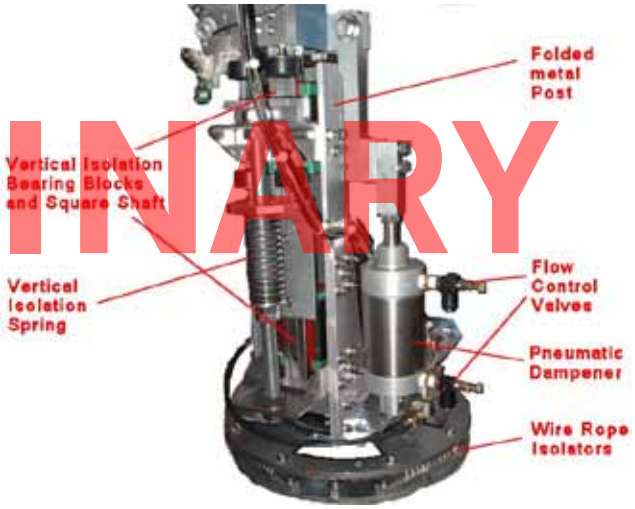
f. Using a screw driver or hook, disconnect one end of the spring and measure its length from inside of hook on one end to the inside of the hook on the other end. Replace the spring if it is stretched or damaged in any way (refer to the replacing the chain tensioner spring procedure in the maintenance chapter.



8. Inspect home switch sensor proximity to the metal home plate. When aligned with the plate, the end of the sensor should not be more than 0.125 inch (0.318cm) from the metal plate (refer to home flag sensor alignment procedure . Assure that the home flag target ring clamp is tight so that it does not rotate around the pedestal spindle.

9. Inspect vertical isolation linear bearing blocks. Look for metal shavings, plastic dust residue or loose ball bearings on the frame and base plate below the assembly. If any signs of wear or failure are noted, contact your dealer immediately for repair.

10. The vertical isolation spring should not be completely compressed or otherwise damaged. Verify that the gap between the upper pair of rubber bumpers and the top of the striker plate and the gap between the lower pair of rubber bumpers and bottom of the striker plate is approximately the same. If the striker plate is very near the upper, or lower, pair of rubber bumpers, contact your dealer immediately for repair.



11. Inspect the pneumatic dampener to assure that the mounting hardware at each end is not coming loose. Bounce the pedestal by applying pressure down on the cross-level beam. A whistling sound will be heard as air expels out from, and is sucked in through, the flow control valves. If a valve has failed, refer to the "pneumatic dampener valve replacement" procedure in the Maintenance section of this chapter. If the pneumatic dampener has failed, refer to the "pneumatic dampener replacement" procedure in the Maintenance section of this chapter

12. Inspect the Cross-Level Motor and belt. Assure that there are no loose motor mounting hardware. Check the motor cable for damage and that the retaining screws are tightened to keep the connector properly terminated.

CAUTION: Be EXTREMELY careful rotating the pedestal around while you fingers are in this area to prevent pinching or crushing your fingers in the pedestal assembly.

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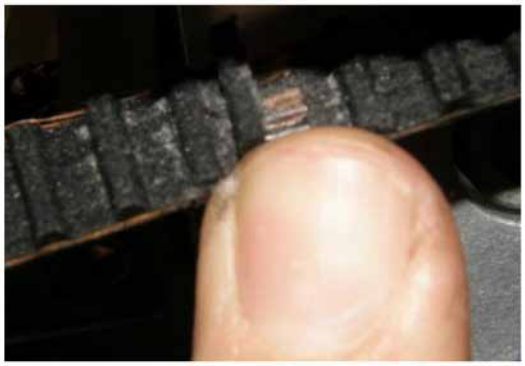
13. Inspect the alignment of the belt through the motor drive sprocket and the driven sprocket. Misalignment will cause the belt to wear along its edges.
14. Inspect the belt teeth for damage. Look for teeth that have de-laminated from, or been completely torn off, of the belt.
15. Inspect the Elevation Motor and belt. Assure that there are no loose motor mounting hardware. Check the motor cable for damage and that the retaining screws are tightened to keep the connector properly terminated.

Belt edge wear

Missing tooth



Seperating tooth and edge wear

CAUTION*: *Be EXTREMELY careful rotating the pedestal around while you fingers are in this area to prevent pinching or crushing your fingers in the pedestal assembly.

16. Inspect the alignment of the belt through the motor drive sprocket and the driven sprocket. Misalignment will cause the belt to wear along its edges.
17. Inspect the belt teeth for damage. Look for teeth that have de-laminated from, or been completely torn off, of the belt.
18. Inspect all harnesses and connections - The harnesses should not be frayed and all the connectors should be properly fastened and retainer screws tightened.
19. Inspect the PCU to assure that all mounting hardware is secure and all the connections are tight.
20. Inspect all hardware, checking for any loose hardware, loose assemblies (PCU, Power Supply, BUC or Motor Driver) or counter-weights. Re-apply Loctite to, and properly tighten, any loose mounting hardware found.
21. Inspect waveguide sections, especially flexible sections, immediately replace any cracked, discolored/burned or broken sections. Do NOT use Loctite on any loose waveguide connecting hardware.
22. Inspect the perimeter of the dish for any damage that would indicate that the dish may have impacted the inside surface of the radome top,
23. Inspect the feed assembly on the back side of the dish to verify that none of the feed, polarization motor or LNB hardware is loose. Check the coax connector on the end of the LNB to assure that it is properly tightened.

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6.4.3. Mechanical Checks

Turn the pedestal power supply ON … set PCU Config to N0000 but do NOT save … Disconnect the TXIF cable from the bracket at the base of the radome to assure that TRANSMIT is disabled.

1. Inspect inside of radome for signs that the dish or feed have been rubbing against the inside of the fiberglass radome.
2. Rotate the pedestal through its full range of azimuth motion (unlimited 360 degrees rotation). The antenna should rotate freely and easily with light finger pressure. There should not be any mechanical or cable restrictions to prevent it rotating full 360 degree rotation with no resistance or drag.
3. Rotate the pedestal through full range of elevation rotation (-15 to +105). The antenna should rotate freely and easily with light finger pressure.

4. Rotate the pedestal through full range of cross-level rotation (+/- 30 degrees). The antenna should rotate freely and easily with light finger pressure.
5. Inspect all drive belts for wear (black dust on/under the area of the belt).
6. Inspect AZ Drive chain. IF chain is beginning to show signs of rust or corrosion, apply a ***light*** coat of light duty oil to the chain. Wipe excess oil off to leave a light coating on the chain. **DO NOT *over-lubricate***.

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7. Maintenance and Troubleshooting

This section describes the theory of operation to aid in troubleshooting and adjustments of the antenna system. Also refer to the Troubleshooting section of your ACU manual for additional troubleshooting details.

	***WARNING**: Electrical Hazard – Dangerous AC Voltages exist in the Breaker Box and the Antenna Pedestal Power Supply. Observe proper safety precautions when working inside the Antenna Breaker Box or Power Supply.*
	***WARNING**: RF Radiation Hazard - This stabilized antenna system is designed to be used with transmit/receive equipment manufactured by others. Refer to the documentation supplied by the manufacturer which will describe potential hazards, including exposure to RF radiation, associated with the improper use of the transmit/receive equipment. Note that the transmit/receive equipment will operate independently of the stabilized antenna system.* **The ultimate responsibility for safety rests with the facility operator and the individuals who work on the system.**
	WARNING**: RF Radiation Hazard - Prior to working on the stabilized antenna system, the power to the **transmit/receive** equipment must be locked out and tagged. **Turning OFF power to the Antenna Control Unit does NOT turn Transmit power output OFF. **The ultimate responsibility for safety rests with the facility operator and the individuals who work on the system.**
	***WARNING**: RF Radiation Hazard - When the transmit/receive system is in operation, no one should be allowed anywhere within the radiated beam being emitted from the reflector.* **The ultimate responsibility for safety rests with the facility operator and the individuals who work on the system.**

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7.1. Warranty Information

Sea Tel Inc. supports its Series 09 systems with a ***ONE YEAR*** warranty on labor and ***TWO YEAR*** warranty on parts.

What's Covered by the Limited Warranty?

The Sea Tel Limited Warranty is applicable for parts and labor coverage to the complete antenna system, including all above-decks equipment (radome, pedestal, antenna, motors, electronics, wiring, etc.) and the Antenna Control Unit (ACU).

What's ***NOT*** Covered by the Limited Warranty?

It does ***not*** include Transmit & Receive RF Equipment, Modems, Multiplexers or other distribution equipment, whether or not supplied by Sea Tel commonly used in Satellite Communications (TXRX) Systems. These equipments are covered by the applicable warranties of the respective manufacturers.

Original Installation of the system must be accomplished by, or under the supervision of, an authorized Sea Tel dealer for the Sea Tel Limited Warranty to be valid and in force.

Should technical assistance be required to repair your system, the first contact should be to the agent/dealer you purchased the equipment from.

Please refer to the complete warranty information included with your system.

7.2. Maintenance

7.2.1. Balancing the Antenna

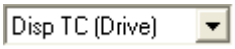
The antenna and equipment frame are balanced at the factory however, after disassembly for shipping or maintenance, balance adjustment may be necessary. The elevation and cross-level motors have a brake mechanism built into them, therefore, ***power*** must be ON to release the brakes and ***antenna drive*** must be

OFF to balance the antenna. . ***Do NOT remove any of the drive belts***. Balancing is accomplished by adding or removing balance trim weights at strategic locations to keep the antenna from falling forward/backward or side to side. The antenna system is not pendulous so 'balanced' is defined as the antenna remaining at rest when left in any position. The antenna should be balanced within one ounce at the typical trim weight location of 10 inches from the axis of rotation.

1. Turn Antenna power breaker ON
2. To turn OFF antenna drive (AZ, EL & CL) follow the Pedestal Control Unit Configuration procedure in this chapter to set the PCU configuration to (N0000) but do NOT save.
3. Balance the antenna elevation axis with the elevation near horizon (referred to as front to back balance) **by adding, or subtracting, small counter-weights**.
4. Then balance Cross Level axis (referred to as left-right balance) **by moving existing counter-weights**. Do NOT add counter-weight during this step.
5. Last, balance the Elevation Axis with the antenna pointed at zenith (referred to as top to bottom balance) **by moving existing counter-weights**. Do NOT add counter-weight during this step.
6. When completed, the antenna will stay at any position it is pointed in for at least 5 minutes (with little, to no, ship motion).
7. Turn antenna power OFF, and then back ON, to re-Initialize the antenna. This will also turn antenna drive (AZ, EL & CL) back ON.

7.2.2. Fine Balance and Monitoring Motor Drive Torque

The DacRemP **DISPTC** graph chart provides a means for monitoring torque commands required for each motor for diagnostic purposes and verifying antenna balance. By observing each trace, the required drive of the antenna via the motor driver PCB may be established.

- To view the Torque Commands, select the 

graph chart.
- This chart displays the Torque Command errors for each axis via three traces, CL (Cross Level), LV (Elevation), and AZ (Azimuth), at a fixed 0.195amps/vertical division.

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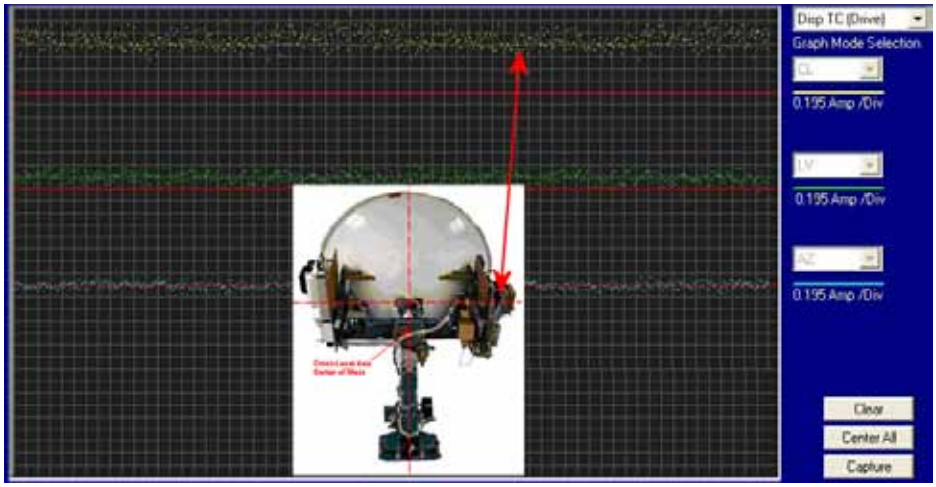
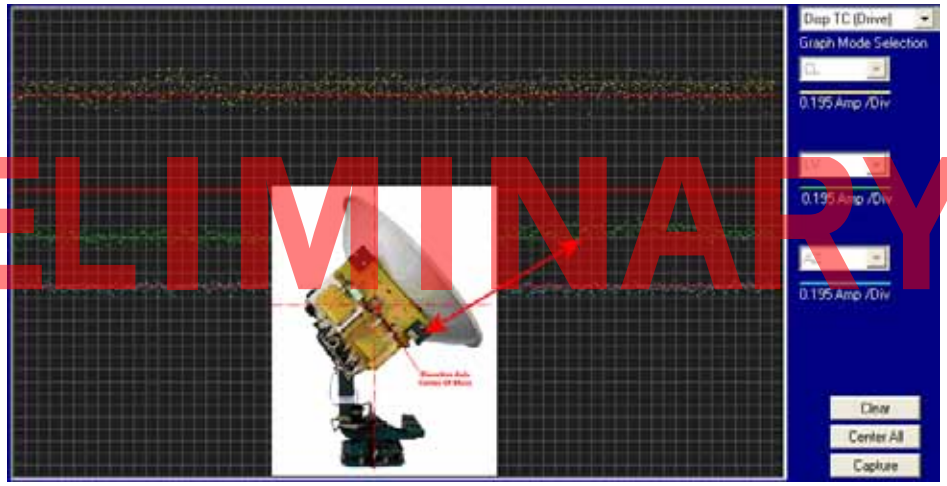
- A normal trace display will be ± 1 divisions from the red reference line while under calm sea conditions and with DishScan Drive turned off. See example below
- The Cross Level display will decrease (plots below red line) as the antenna requires drive to the left and increase (plots above red line) as the antenna requires to the right.

  Example: The antenna pictured in the screen capture below is imbalanced so that it is “Right Heavy”. The CL trace is plotting above the red reference line (indicating that drive CCW is required to maintain a 90°Cross-Level position).



- The Level display should decrease (plots below red line) as the antenna requires drive forward (Up in elevation) and increase (plots above red line) as the antenna requires drive back (Down in elevation).
- Example: The antenna pictured in the screen capture below is imbalanced so that it is "Front Heavy". The LV trace is plotting above the red line (indicating that drive CW is required to maintain the current elevation position).



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- The Azimuth display should decrease (plots below red line) as the antenna is driven CCW and increase (plots above red line) as the antenna is rotated CW.

7.2.3. Polang Alignment

If the polarization motor or pot have been replaced, use this procedure to realign the feed assembly and potentiometer.

Step 1: In the ACU setup menu, go to the Pol Type parameter and set to Polang to manual Mode:

1. Get into the 'SETUP' mode by pressing and holding the two **LEFT** & **RIGHT** arrows until the 'EL TRIM' window appears.
2. Briefly release and then push and release both **LEFT** & **RIGHT** arrow keys again. The 'SAVE NEW PARAMETERS' window should now be displayed.
3. Push either the '**UP**' arrow key until the 'Pol Type' parameter is displayed.
4. Use the **LEFT** & **RIGHT** arrow keys to select appropriate digits then use the '**UP** & **DOWN**' arrow keys to change value. For Manual Polarization Mode set this parameter to 9. (To put antenna into Auto Polarization Mode set to Pol Type to 72)

Step 2: Press ENTER '**ENTER**' key to go to Pol Offset window and verify setting is 0040. (If necessary use arrow keys to select appropriate digits and change accordingly)

Step 3: Press ENTER '**ENTER**' key to go to Tx Pol parameter and ensure it is set to 0002. (If necessary use arrow keys to select appropriate digits and change accordingly)

Step 4: Press NEXT '**NEXT**' key to select Antenna Window.

Step 5: Press ENTER '**ENTER**' key until 'Pol xxxx' is displayed.

Step 6: Using the ▲▼ '**UP & DOWN**' arrow keys rotate Pol until a count of 130 is achieved.

Step 7: Enter radome and observe physical alignment of LNB. For the xx06 series the LNB should be aligned in a Vertical orientation, (Fig 1.0). If not vertical, turn DishScan Drive off, drive Elevation to 0 and continue on to step 8, else skip ahead to step 13.

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(Fig 1.0)

(*Steps 8-12 requires assistance to observe and operate antenna simultaneously*)

Step 8: Using the DAC2202 ACU manually drive the feed assembly to vertical.

5. Press the ▶ '**RIGHT**' arrow key to display cursor to the right of the displayed Pol Value
6. Using the ▲▼ '**UP & DOWN**' arrow keys to increment & decrement Pol Value, drive the LNB to achieve a vertical orientation of the LNB as described in Step 7.

Step 9: Locate the Pol Potentiometer on the feed and loosen the screw that secures the slotted mounting plate (fig. 1.1), then carefully slide the POL pot gear out of alignment with the main driven gear (Fig. 1.2).

(Fig 1.1)

(Fig 1.2)

Step 10: On the ACU, push ENTER '**ENTER**' key so that the cursor is not within the Pol display (Fig 1.3, failure to do this will result in display not changing). Rotate the Pol Pot gear manually until a count of 130 is achieved

(Fig 1.3)

Step 11: Reengage Pol Pot gear with the driven gear, while trying to maintain the 130 Pol Value set in step 10 and tighten the mounting plate screw loosened in step 9. (A Pol Value Variance of ± 3 counts is acceptable while trying to reengage the gears)

Step 12: Drive Polang to upper and lower electrical limits and verify drive direction & full range of motion of feed assembly.

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7. On the ACU, '**RIGHT**' arrow key to display cursor underneath Pol Value
8. Press the '**UP**' key to drive feed fully CW and verify Pol value of 222(upper electrical limit).
9. Press the '**DOWN**' key to drive feed fully CCW and verify Pol Value of 41 (lower electrical limit).

Step 13: In the ACU setup menu, go to Pol Type parameter and set antenna back to Auto Pol Mode:

10. Briefly release and then push and release both **LEFT** & **RIGHT** arrow keys again. The 'SAVE NEW PARAMETERS' window should now be displayed.
11. Push the '**UP**' arrow key a few times until the until the 'Pol Type' parameter is displayed.
12. Use the **LEFT** & **RIGHT** arrow keys to display a cursor under appropriate Pol value digits then use the '**UP** & **DOWN**' arrow keys to change value. Then Press ENTER '**ENTER**' key. For Auto Polarization Mode set to Pol Type to 72.

7.2.4. To Reset/Reinitialize the Antenna:

Pressing Reset on the ACU front panel does NOT cause a reset of the above decks equipment. To Re-initialize the antenna from the **REMOTE COMMAND** window on the ACU:

1. Using the **LEFT/RIGHT** and **UP/DOWN** arrow keys set the Remote Command value to "**^0090**" and press **ENTER**.

This resets the PCU on the antenna. The antenna will reinitialize with this command (Performs a similar function as a power reset of the antenna).

7.2.5. Replace Wire Rope Isolators

Use Sea Tel replacement kit 129980

1. Place the wedge provided in the wire rope replacement kit in between the upper and lower base plates near one of the wire rope isolators. 2. Using a 6mm wrench, loosen the bottom bolts at each end of one of the wire rope isolators near the wedge. 3. Loosen, remove and discard the top bolts at each end of the wire rope isolator.	
4. Remove the wire rope isolator, discard it and the bottom bolts. 5. Apply Loctite to 2 of the M6x20 bolts provided in the kit. Place a lock washer, and then a flat washer, on each bolt and place them in the bottom bar of the replacement wire rope isolator. 6. Slide the replacement wire rope isolator into place in between the upper and lower base plates.	
7. Align and start the bottom bolt in the threaded hole of the bottom plate. 8. Apply Loctite to 2 of the M6x25 bolts provided in the kit. Place a lock washer, and then a flat washer, on each bolt and place them into the top bolt holes, move the upper bar of the wire rope isolator to align the top bolt with the threaded hole in top bar of the replacement wire rope isolator. 9. Tighten the upper and lower bolts to torque spec.	
10. Repeat steps 1 through 9 to replace each of the other 3 wire rope isolators.	

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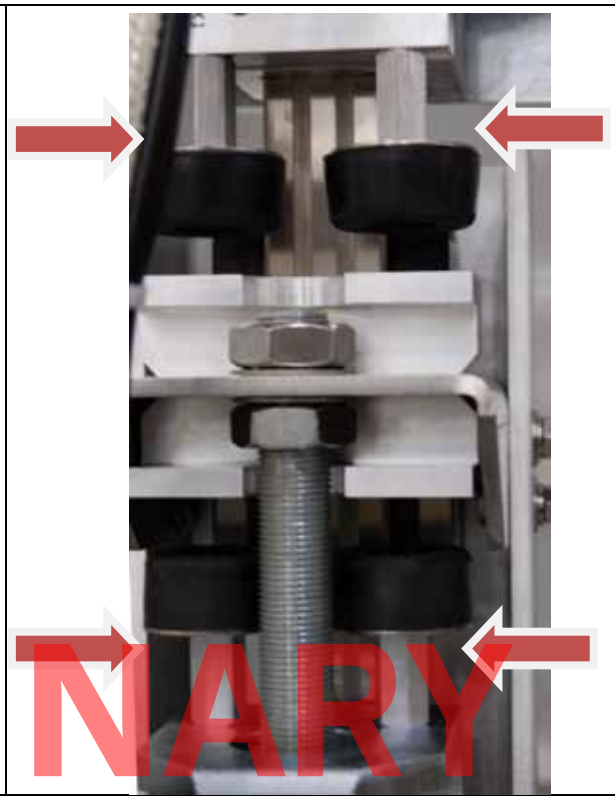
7.2.6. Replacing the Rubber Bumpers

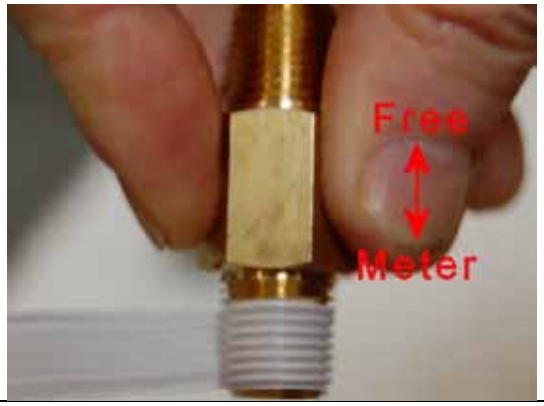
Use Sea Tel replacement kit 129978

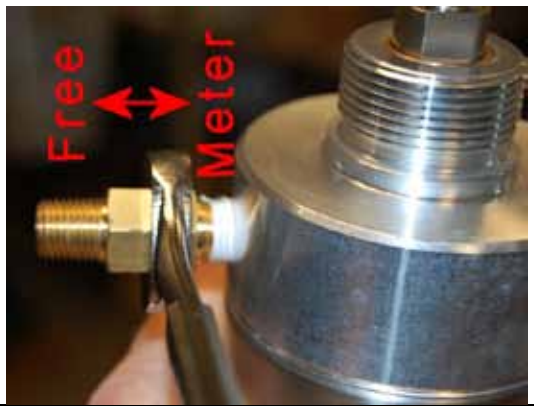
11. Using a 6mm wrench, loosen and remove all four of the rubber bumper assemblies. 12. Apply Loctite to the exposed threads of the four replacement rubber bumper assemblies. 13. Install and tighten the four replacement rubber bumper assemblies to torque spec.	

PRELIMINARY

7.2.7. Replacing the Flow Control Valves

Use Sea Tel replacement kit 129976

1. Using a ___mm wrench, remove the flow control valves installed in the side of the pneumatic dampener.	
2. Using the pipe thread sealant tape provided in the kit apply 2 or 3 wraps of tape around the “meter” end of each of the replacement flow control valves..	

3. Install the replacement flow control valves in the side of the pneumatic dampener.	

7.2.8. Replacing the Pneumatic Dampener

Use Sea Tel replacement kit 129977

4. Using a 12mm wrench, loosen, remove and discard the top bolt of the pneumatic dampener assembly.	

PRELIMINARY

5. Loosen, remove and discard the bottom bolt of the pneumatic dampener assembly. 6. Discard the pneumatic dampener assembly. 7. Apply Loctite to the M12x40 and M12x55 bolts provided in the kit. Place a lock washer on each bolt. 8. Install the M12x55 bolt through the bottom of the replacement pneumatic dampener and into the threaded mounting.. 9. Install the M12x40 bolt through the hole in the top of the replacement pneumatic dampener assembly and into the threaded mounting. hole. NOTE: You may need to lift, or pull down on, the upper pedestal to align the hole for the upper bolt to thread into the bracket on the upper pedestal.	
10. Tighten the upper and lower bolts to torque spec. 11. Install the flow control valves using the procedure above.	

PRELIMINARY

7.2.9. Replacing the Chain Tensioner Spring

Use Sea Tel PN: 116175-3

1. Using a screw driver, or hook, release the spring from the tensioner arm. 2. Un-hook the spring from the bracket that is attached to the bottom of the Azimuth Motor mounting bracket. 3. Hook the replacement spring onto the bracket on the bottom the Azimuth Motor mounting bracket. 4. Using a screw driver, or hook, attach the other end of the replacement spring to the tensioner arm.	

7.3. Pedestal Control Unit Configuration – Series 09

The PCU is designed to be used with a variety of antenna pedestal models. So, the PCU must be configured correctly for the model number of the antenna it is mounted on. The configuration information that is unique to each pedestal model is stored in a Non Volatile Random Access Memory (NVRAM) in the PCU enclosure. If the PCU is replaced or the NVRAM in the PCU should become corrupt, the PCU must be re-configured to operate with the pedestal it is installed on. The default configuration for the PCU is model **xx09**. *In this configuration the brakes will be open but none of three torque motors (AZ, EL or C/L) will drive to prevent damage to the unknown pedestal.*

7.3.1. To configure the PCU;

1. Select the REMOTE COMMAND window on the ACU.
2. Refer to the table below to key in the appropriate value for you model antenna to enter in the next step. ***EXAMPLE:*** For a **5009** Model Antenna, select system type 0005.
3. Using the **LEFT/RIGHT** and **UP/DOWN** arrow keys set the Remote Command value to "**N0005**" and press **ENTER**. The display should now show "N0005".
4. Press **ENTER** several times to select ***REMOTE PARAMETERS***. Press **LEFT** arrow and then **ENTER** to save the system type in the PCU.
5. Press **RESET** and the displayed Remote Version Number should now display "**5009** VER 0.05".

7.3.2. Model Configuration Numbers

The following table shows the current mode configuration values for Series 06 pedestals.

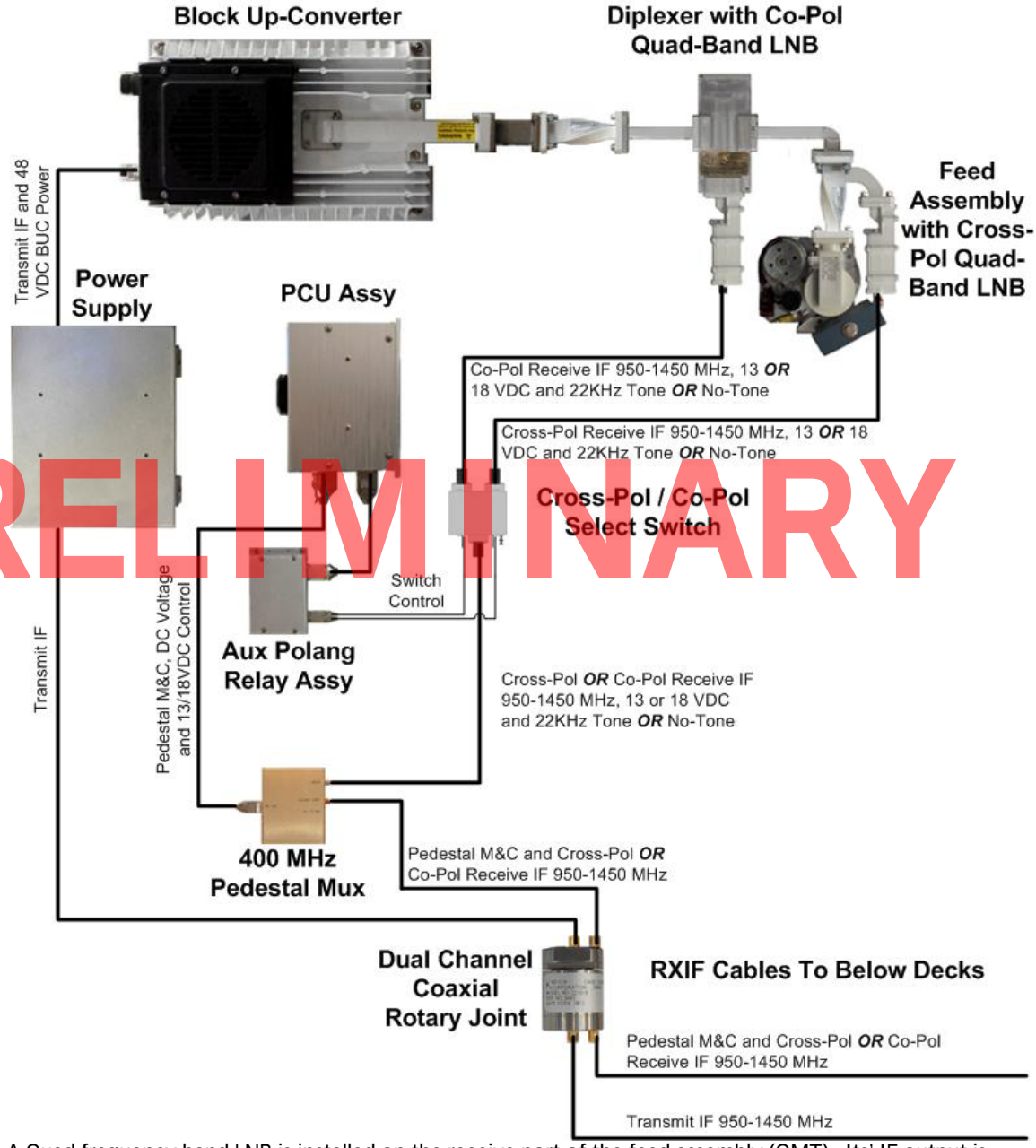
MODEL	Configuration Number
xx09	N 0000 Turns off all drive motors
4009	N 0004
5009	N 0005
6009	N 0006

PRELIMINARY

7.4. Troubleshooting

7.4.1. RF Flow: Cross-Pol/Co-Pol switching and Quad Band LNBs

Your antenna system has hardware components installed onto it to allow the operator a choice of providing either Co-Pol or Cross-Pol receive IF signal (in any of four frequency bands) to your satellite modem via the Tracking Band selection (refer to Chapter 5 for detailed setup information on this parameter or Chapter to for detailed operation information).


Block Up-Converter
Diplexer with Co-Pol Quad-Band LNB
Feed Assembly with Cross-Pol Quad-Band LNB
Transmit IF and 48 VDC BUC Power
Power Supply
PCU Assy
Co-Pol Receive IF 950-1450 MHz, 13 OR 18 VDC and 22KHz Tone OR No-Tone
Cross-Pol Receive IF 950-1450 MHz, 13 OR 18 VDC and 22KHz Tone OR No-Tone
Cross-Pol / Co-Pol Select Switch
Switch Control
Pedestal M&C, DC Voltage and 13/18VDC Control
Aux Polang Relay Assy
Transmit IF
Cross-Pol OR Co-Pol Receive IF 950-1450 MHz, 13 or 18 VDC and 22KHz Tone OR No-Tone
400 MHz Pedestal Mux
Pedestal M&C and Cross-Pol OR Co-Pol Receive IF 950-1450 MHz
Dual Channel Coaxial Rotary Joint
RXIF Cables To Below Decks
Pedestal M&C and Cross-Pol OR Co-Pol Receive IF 950-1450 MHz
Transmit IF 950-1450 MHz

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A Quad frequency band LNB is installed on the receive port of the feed assembly (OMT). Its' IF output is routed via coax to a 75 ohm coax switch assembly to provide Cross-Pol Receive IF to below decks when selected. A second Quad frequency band LNB, installed onto the receive port of a WR-75 diplexer, located within the TX waveguide path between the BUC and the TX port of the feed assembly. The IF output of this LNB provides Co-Pol Receive IF to below decks when selected.

The output port of the coax switch is connected to the L-band port Pedestal M&C Mux, to provide Co-Pol or Cross-Pol LNB output, of the selected frequency band, through the receive channel of the rotary joint to below decks via the receive IF coax cable.

There are three controls applicable to the LNB's installed on this system; 1 operational voltage selection, 2 operational tone control and selection of Co-Pol ***OR*** Cross-Pol Receive IF. Voltage and Tone, used to select the frequency band of the LNB, are supplied to the LNB which has been selected by the Co-Pol/Cross-Pol switch. DC voltage is supplied by the pedestal modem and Tone is supplied by the tone generator. The Band and Polarity of the Receive IF is selected by the Tracking Band setting in the ACU. Your service provider will determine which frequency band and whether to use Co-Pol or Cross-Pol for normal operation. The chart below may be used to determine what tracking band setting to utilize and ***only*** applies when the "TrackDisp" parameter is set to 0130 (refer to chapter 5 for detailed information on this parameter).

Tracking Band Setting	Tone, LNB Voltage & Switch state	Receive IF Polarity
Xp B1	Tone OFF, Volt 13, Aux 0	Cross-Pol Band 1
Xp B2	Tone ON, Volt 13, Aux 0	Cross-Pol Band 2
Xp B3	Tone OFF, Volt 18, Aux 0	Cross-Pol Band 3
Xp B4	Tone ON, Volt 18, Aux 0	Cross-Pol Band 4
Cp B1	Tone OFF, Volt 13, Aux 1	Co-Pol Band 1
Cp B2	Tone ON, Volt 13, Aux 1	Co-Pol Band 2
Cp B3	Tone OFF, Volt 18, Aux 1	Co-Pol Band 3
Cp B4	Tone ON, Volt 18, Aux 1	Co-Pol Band 4

The Transmit IF and a 10 MHz reference signal is generated from the below decks satellite modem after a positive Rx lock has been established. These signals are then routed through the transmit path of a dual channel rotary joint via coax to a power supply where 48Vdc is injected and passed to a Block Up Converter. The BUC then up converts (hi-side injection) and amplifies the IF signal and routes the resultant RF to the Tx port of the diplexer via waveguide. The diplexer passes the RF through to its' common port and then is routed to the transmit port of the feed (OMT) via waveguide.

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7.4.2. Series 09 TXRX Antenna Initialization

Turn the pedestal power supply ON. The brakes on the Elevation and Cross-Level motors will release. Brake release power supply control circuit supplies 24 VDC to the brakes initially (5-10 seconds) and then reduces the voltage to 12VDC. The PCU will initialize the stabilized portion of the mass to be level with the horizon and at a prescribed Azimuth and Elevation angles. The antenna will go through the specific sequence of steps (listed below) to initialize elevation, cross-level and azimuth to predetermined starting positions.

Initialization is completed in the following phases, each phase must complete properly for the antenna to operate properly (post-initialization). Observe the Initialization of the antenna pedestal.

Step 1. Elevation axis then activates - Input from the LV axis of the tilt sensor is used to drive the Elevation of the equipment frame to bring the tilt sensor LV axis to level. This step takes approximately 10 seconds and will result in the dish being at 45.0 degrees in elevation. The level cage may still be tilted left or right at this time.

Step 2. Cross-Level axis activates - Input from the CL axis of the tilt sensor is used to drive Cross-Level of the equipment frame to bring the cross-level axis of the tilt sensor to level (this results in the tilt of the Cross-Level Beam being level). This step takes approximately 10 seconds.

Step 3. Azimuth axis activates - Antenna drives CW in azimuth until the "Home Flag" signal is produced. This signal is produced by a Hall Effect sensor in close proximity to a Magnet. After another 10 second wait, the antenna will report its version number at the Antenna Control Unit (ACU).

This completes the phases of initialization. At this time the antenna elevation should 45.0 degrees and Relative azimuth should be at home flag (home switch hall sensor at the magnet in the azimuth driven sprocket).

If any of these steps fail, or the ACU reports model "**xx09**", re-configure the PCU as described in the Maintenance section of this manual. If initialization still fails, this indicates a drive or sensor problem, refer to the Troubleshooting section.

7.4.3. Troubleshooting using DacRemP

While troubleshooting a Sea Tel 3-Axis Antenna System, you must classify the fault you are dealing with as a failure within one of 3 major system functions, Targeting, Stabilization, and Tracking. Should there be a failure with any one of these functions, your system will not operate properly. A few simple checks may help determine which fault (if any) that you are dealing with. The matrix below lists some test(s) and which of the DacRemP graph selection would be best to use to identify a fault. The end of this chapter contains examples on how to use DacRemP to diagnose a fault.

Targeting: is the ability to accurately point the antenna to an angular position in free space and is controlled by the ACU. (Does the system drive to the Azimuth, Elevation, and Polarity positions within 1 degree of the desired satellite?)

Stabilization: is the process of de-coupling the ships motion from the antenna and is controlled by the PCU. (Does the system maintain the satellite link after turning off TRACKING?)

Tracking: is the process of issuing fine adjustments to the **pointing** angle of the antenna to optimize the received signal level and is controlled by the ACU. (Does the system pass a four quadrant-tracking test?)

Functional Test(s)	DacRemP Graph Selection to use	System Function(s)
Four Quadrant Tracking.	ADMC (Position)	Tracking
Azimuth Encoder Verification.	ADMC (Position)	Targeting
Sea Trial	ADMC (Position)	Targeting Tracking Stabilization
Side Lobe Plots	ADMC (Position)	Tracking
Targeting Alignment (AZ & EL Trims)	ADMC (Position)	Targeting
Determine Blockage Mapping	ADMC (Position)	Tracking
Unwrap recovery (Limited Az systems only)	ADMC (Position)	Stabilization
Pedestal Gain Verification	DISPIVC (Loop Error)	Stabilization
Home switch (flag) verification (Unlimited Az systems only)	DISPV (Ref)	Stabilization
Remote Tilt Verification	DISPV (Ref)	Targeting Stabilization
Level cage alignment Verification (sensor alignment)	DISPV (Ref)	Targeting Stabilization
Rate Sensor Output Verification	DISPW (Rate)	Stabilization
Level and CL fine balance Verification	DISPTC (Drive)	Stabilization
AZ Friction Torque Test	DISPTC (Drive)	Stabilization
DishScan Drive/Phase	DishScan XY	Tracking Stabilization

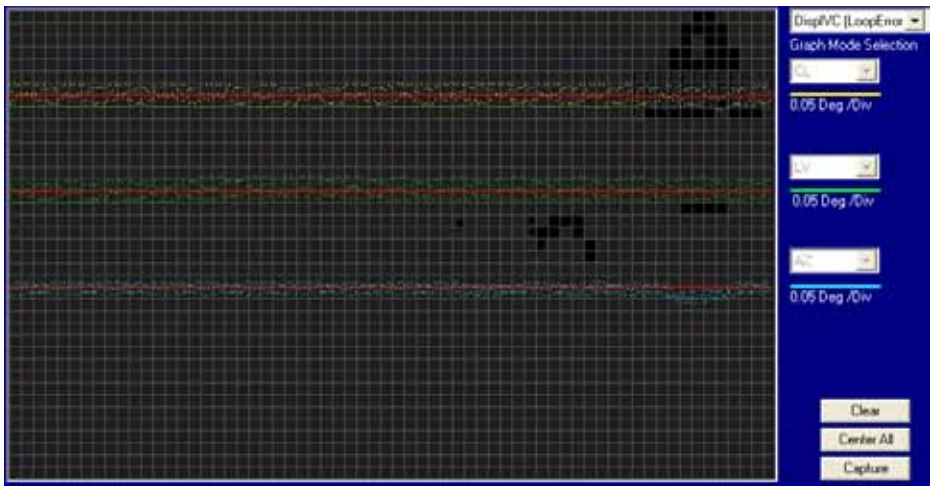
PRELIMINARY

7.4.4. Antenna Loop Error Monitoring

The DacRemP **DISPIVC** graph chart provides a means for monitoring the accumulated velocity errors of the antenna for diagnostic purposes. If this error is excessive, it indicates external forces are acting on the antenna. These forces may be the result of but not restricted to static imbalance, excessive bearing friction,

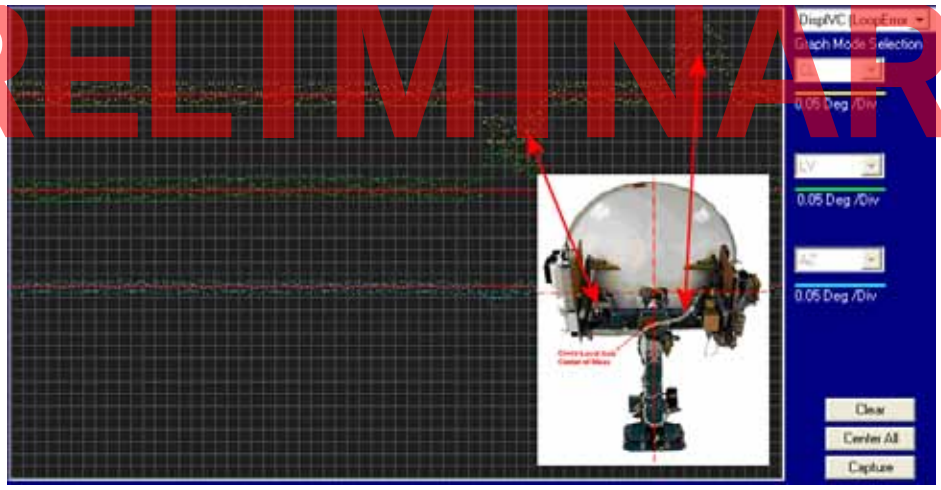
cable binding, or wind loading. If these forces cause the antenna to mis-point by more than 0.5° from the desired position the PCU will flag a "Stab Limit" error.

- To view the position error, select the DisplVC (LoopError graph chart.



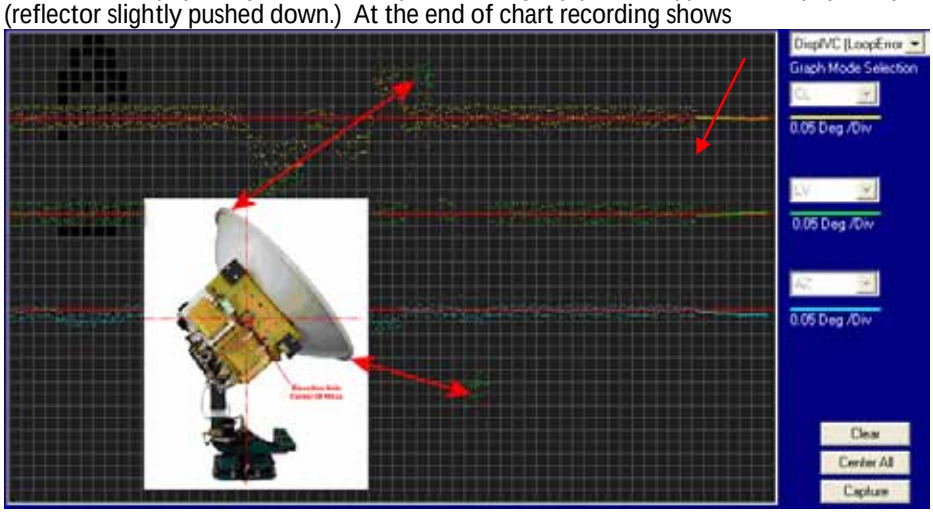
- This chart displays sensed axis errors via three traces, CL (Cross Level), LV (Elevation), and AZ (Azimuth), at a fixed 0.05º/ vertical division.
- The normal trace average will plots it's display ± 3 divisions from the red reference line. Any trace line average plotted above this is of concern and troubleshooting required. The example below shows the forces exerted onto the antenna as a resultant of DishScan Drive. The example below shows the results of various forces put upon antenna.

PRELIMINARY



- Cross-Level Axis physically moved CCW (down to the left.) and then CW (up to the right.)

Elevation Axis physically moved CW. (reflector slightly pushed up) and then physically moved CCW. (reflector slightly pushed down.) At the end of chart recording shows



- DishScan Drive turned Off, notice the lack of accumulated IVC errors.

7.4.5. Open Loop Rate Sensor Monitoring

The DacRemP **DISPW** graph chart provides a means for monitoring the output of the 3 solid state rate sensors (located inside the Level Cage Assembly) for diagnostic purposes. The rate sensors are the primary inputs to the PCU for stabilization.

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- To monitor the rate sensors, select the Disp W (Rate) graph chart
- This chart displays sensed output from the 3 rate sensors via three traces, CL (Cross Level), LV (Elevation), and AZ (Azimuth), at a fixed 1º/Second/vertical division.
- A normal trace display will be ± 1 divisions from the red reference line. The example shown below shows an antenna that is NOT currently sensing motion in any axis.

- The Cross Level display should decrease (plots below red line) as the antenna is tilted to the left and increase (plots above red line) as the antenna tilted to the right.
- The Level display should decrease (plots below red line) as the antenna is tilted forward and increase (plots above red line) as the antenna is tilted back.
- The Azimuth display should decrease (plots below red line) as the antenna is rotated CCW and increase (plots above red line) as the antenna is rotated CW. In the example below, the output of the Azimuth rate sensor is plotted above the reference line, indicating that the antenna was driven CW in Azimuth. Due to the in-practicality of driving an axis at a consistent rate, verification of rate sensor output is, for the most part restricted to a positive or negative response of the Level Cage movement (plotting above or below the red reference line of each axis).

7.4.6. Open Loop Motor Test

The DacRemP **Comm Diagnostics** Window provides a means to enter in Remote Commands for driving each individual torque motor to test that motors functionality. By driving each axis and observing the resulting motion of the antenna, a coarse operational status of the motor and motor driver may be established.

- To manually drive the motors, select the **"Comm Diagnostics"** window under to the Tools submenu or Press "CTRL + C"
- Using the small field in the upper left hand corner of the window, type in the remote command and verify the motor appropriately drives in the direction commanded.
- To drive the Cross Level motor, key in ^1064, ^1128 or ^1192 and press **ENTER** to drive the Cross Level axis LEFT, OFF or RIGHT respectively.
- To drive the Level motor, key in ^2064, ^2128 or ^2192 and press **ENTER** to drive the level axis FORWARD, OFF or BACKWARD respectively.
- To drive the Azimuth motor, key in ^3064, ^3128 or ^3192 and press **ENTER** to drive the azimuth axis CW, OFF or CCW.

PRELIMINARY

7.4.7. To Disable/Enable DishScan

To be able to use Step Track, or to revert to Conscan, as your active tracking mode you will have to disable DishScan.

Select the **DISHSCAN** parameter window on the ACU:

1. Press the RIGHT arrow, then press the UP arrow and last press the ENTER key to turn DishScan mode ON.
2. Press the RIGHT arrow, then press the DOWN arrow and last press the ENTER key to turn DishScan Mode OFF.

If you change this remote parameter, you must save the change using REMOTE PARAMETERS.

If DishScan is **OFF** and the **Step Integral** parameter is set to **0000**, you will get a ***constant*** ERROR **0016** (DishScan error) and you will see ***zeros*** flashing in the lower left of the Azimuth and Elevation ENTRY menu displays. This is a visual indication that DishScan is turned OFF.

7.4.8. Satellite Reference Mode

The ships gyro compass input to the ACU may be accurate and stable in static conditions and yet may NOT be accurate or stable enough in some underway dynamic conditions. If there is no gyro compass or if the

input is corrupt, not stable or not consistently accurate the tracking errors will become large enough to cause the antenna to be mis-pointed off satellite.

Satellite Reference Mode will uncouple the gyro reference from the azimuth rate sensor control loop. This decoupling of the Gyro source only happens 5 minutes after an azimuth command has been sent to the antenna by means of an AZ target command, a search pattern initiated, or the a Satellites longitudinal position is targeted. When operating in Satellite Reference Mode changes in ships gyro reading will reflect its changes to the ACU's display but will not directly affect the azimuth control loop. The Pedestal Control Unit will stabilize the antenna based entirely on the azimuth rate sensor loop and the tracking information from DishScan. This will keep the azimuth rate sensor position from eventually drifting away at a rate faster than the tracking loop can correct by using the tracking errors to regulate the rate sensor bias.

Satellite Reference Mode can be used as a diagnostic mode to determine if tracking errors are caused by faulty gyro inputs.

Satellite Reference Mode ***MUST be used when:***

- No Gyro Compass is available
- Frequent or constant ACU Error Code 0001 (Gyro Compass has failed)
- Gyro Compass output is NMEA heading
- Flux Gate Compass is being used
- GPS Satellite Compass is being used

To view, or change, the Satellite Reference Mode status, select the SAT REF remote parameter:

3. Press the RIGHT arrow, then press the UP arrow and last press the ENTER key to turn Satellite Reference Mode ON.

4. Press the RIGHT arrow, then press the DOWN arrow and last press the ENTER key to turn Satellite Reference Mode OFF.

If you change this remote parameter, you must save the change using REMOTE PARAMETERS.

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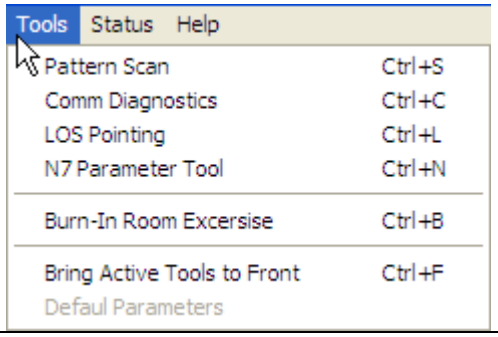
7.4.9. To Read/Decode an ACU Error Code 0008 (Pedestal Function Error):

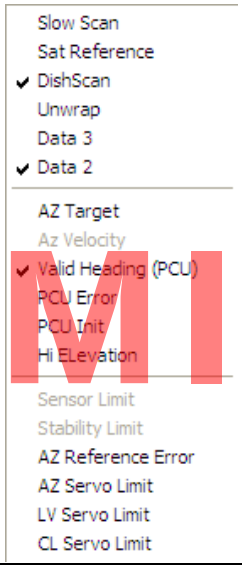
An Error Code 8 as reported by the ACU is an indication that the above decks equipment has experienced an error. One of the functions available within the "**Comm Diagnostics**" tool window provides the means to read and decode the actual discreet Pedestal Function Error.

1. Select the **"Comm Diagnostics"** window under to the Tools submenu or Press "CTRL + C"	

2. Left mouse click on the ?S icon.

3. Right mouse click on the ?S icon.

This will display a list box with the status of the above decks pedestal filtered into 3 sections. Items preceded with a check marks indicate a flagged status. See matrix below for further information on each state.



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State	Description
PCU Status (Word 1)	
Slow Scan	Indicates antenna is in a specialized mode, Slow Scan, which is required when ever a test requires driving the antenna >5°/sec
Sat Reference	Indicates that satellite reference mode is enabled.
DishScan	Indicates that DishScan Drive is enabled.
Unwrap	Indicates that the antenna is currently in an “Unwrap” state. This is not a valid error for unlimited azimuth antenna systems
Data 3	Indicates active communication between above decks and below decks equipment at the time of query
Data 2	Indicates active communication between above decks and below decks equipment at the time of query

PCU Status (Word 2)	
Az Target	Indicates the antenna is currently targeting a pre-determined azimuth position
Az Velocity	**Not a valid state**
Valid Heading (PCU)	Indicates that the PCU has received and integrated the heading value from the ACU into the Azimuth Stabilization Loop. This is NOT an indication of a proper Heading integration into ACU.
PCU Error	Indicates that one or more errors have been reported by the above decks equipment.
PCU Init	Indicates that the above decks equipment is currently performing an Initialization sequence
Hi Elevation	Indicates that the above decks equipment is operating an Elevation Position higher than 83°
PCU Error Status (Word 3)	
Sensor Limit	**Not a valid state**
Stability Limit	Indicates that the above decks equipment is mis-pointed from its intended target by more than 0.5°. (FCC Tx Mute Compliance)
AZ Reference Error	Indicates a failure to integrate one the reference inputs within the Azimuth Stabilization Loop.
AZ Servo Limit	Indicates the current draw through the Azimuth Servo Amplifier (motor driver PCB) has exceeded what is required during normal operation
LV Servo Limit	Indicates the current draw through the Elevation Servo Amplifier (motor driver PCB) has exceeded what is required during normal operation
CL Servo Limit	Indicates the current draw through the Cross-Level Servo Amplifier (motor driver PCB) has exceeded what is required during normal operation

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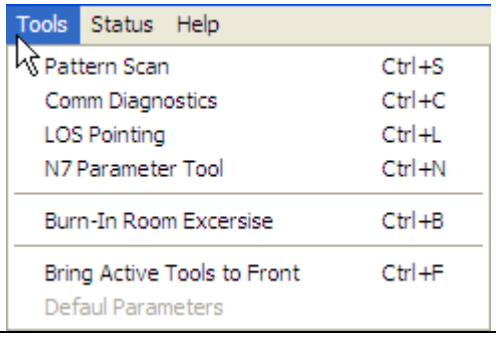
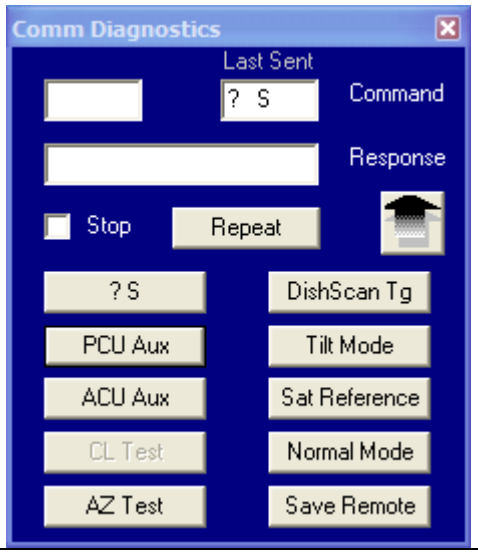
7.4.10. Remote GPS LAT/LON Position:

The above decks equipment has an integrated on board Furuno GPS antenna system. The Latitude and Longitude position information provided are utilized to calculate the Azimuth, Elevation, Cross-level and Polarity pointing angles of the desired satellite. The DacRemP "**Comm Diagnostics**" Window provides a means to query the GPS antenna to verify proper operation. The procedure below describes this process.

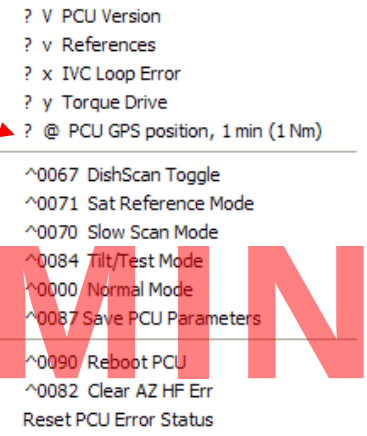
1. Select the "**Comm Diagnostics**" window under to the Tools submenu or Press "CTRL + C"



2. Left mouse click on the PCU Aux icon.



3. Left Mouse click on the "?@ PCU GPS position, 1 min (1 Nm)"

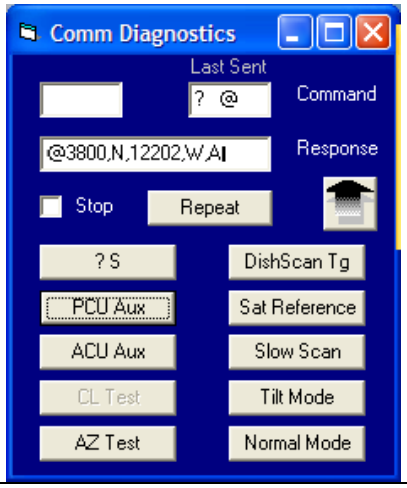

? V PCU Version
? v References
? x IVC Loop Error
? y Torque Drive
? @ PCU GPS position, 1 min (1 Nm)
^0067 DishScan Toggle
^0071 Sat Reference Mode
^0070 Slow Scan Mode
^0084 Tilt/Test Mode
^0000 Normal Mode
^0087 Save PCU Parameters
^0090 Reboot PCU
^0082 Clear AZ HF Err
Reset PCU Error Status

4. In the "Response" window verify proper GPS position to within 1 nautical mile of your current position.

The Latitude & Longitude position of the GPS will be displayed in the following format:

"@ LAT,N,LON,E,A"

Where LAT and LON are in degrees and minutes, LAT will be followed by N or S (North or South), LON will be followed by E or W (East or West), then a status character and finally a checksum character.



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Furuno default value is in Japan at 34.4N 135.2E (@3444,N,13521,E,,_). After acquiring a good fix at Sea Tel the string is @3800,N,12202,W,A^ for our 38N 122W Latitude and Longitude position. The status character tells you the status of the GPS. **","** (Comma) = GPS has NOT acquired a proper fix, **"N"** = GPS fix is NOT valid **"A"** = GPS has acquired a valid fix.	

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8. 6009-33 Technical Specifications

The specifications of your 6006 antenna system are below.

8.1. Antenna Assembly 6009

The antenna assembly is comprised of the Dish, feed assembly and LNB. A variety of LNBs could be used, refer to LNB specification for the LNB that is provided with your system.:

Reflector Size:	Diameter – active area 1.5 M (60.0 inch)
Reflector Type	Spun Aluminum axis symmetric prime focus reflector
Feed	Center focus Cassegrain feed with integral 9GHz radar filter and Cross-Pol OMT
Cross Pol Isolation:	On axis: > 35dB, Off axis: > 30dB within 1dB contour
Port to Port Isolation	35 dB typical
Polarization	Linear w/motorized skew adjustment
Polarization control	24 volt DC motor with pot feedback
Transmit frequency range	13.75-14.5 GHz Ku Band
Receive frequency range	10.70-12.75 GHz Ku Band
Antenna Gain	
TX Gain	45.3 dBi at 14.5 GHz Typical
RX Gain	43.6 dBi at 12.0 GHz Typical
Antenna Efficiency	65 Percent minimum
Antenna G/T	TBD

PRELIMINARY

8.2. SMW Quad Band LNB

Band 1	
Voltage Required	13 VDC
Input RF Frequency	10.95-11.70 GHz
Local Oscillator Frequency	10.00 GHz
Output IF Frequency	950 to 1700 MHz
Band 2	
Voltage & Tone Required	13 VDC + 22 KHz Tone
Input RF Frequency	11.70-12.25 GHz
Local Oscillator Frequency	10.75 GHz
Output IF Frequency	950 to 1500 MHz
Band 3	
Voltage Required	18 VDC
Input RF Frequency	12.25-12.75 GHz
Local Oscillator Frequency	11.30 GHz
Output IF Frequency	950 to 1450 MHz
Band 4	
Voltage & Tone Required	18 VDC + 22 KHz Tone
Input RF Frequency	10.70-11.70 GHz
Local Oscillator Frequency	9.75 GHz
Output IF Frequency	950 to 1950 MHz
Gain (typ)	54 dB
Noise Figure	0.8 dB
Current (typ)	270 mA

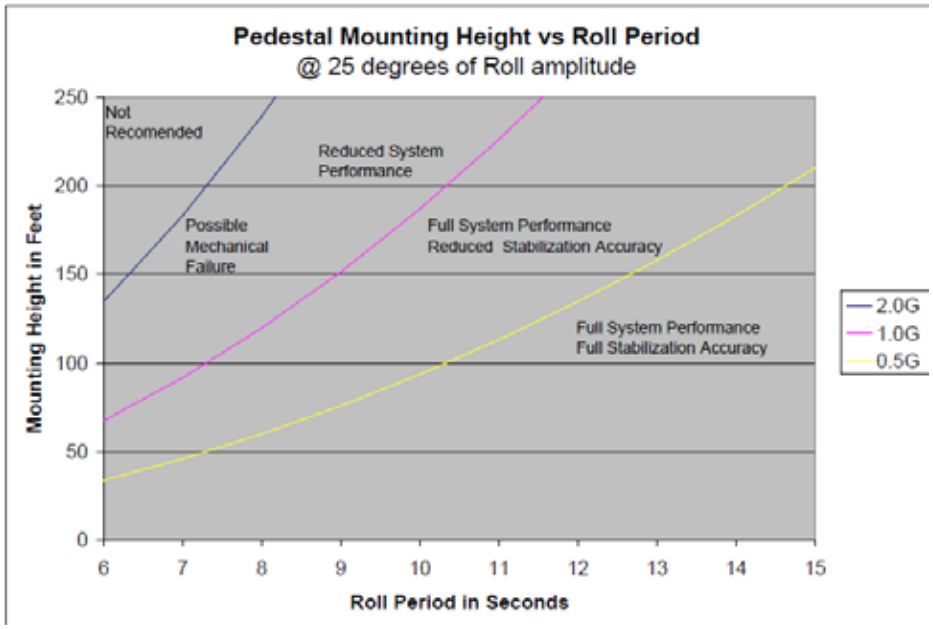
8.3. TX Radio Package

SSPBUC (Block Up-Converter)	NJRC 5017, 8 Watt SSPBUC
Co-Pol Diplexer	DPX75K-002
Common Port (to feed)	WR-75 Flange, 10.70-14.5 GHz
Transmit Output (from SSPB)	WR-75 Flange, 13.75-14.5 GHz
Receive Output (to Co-Pol LNB)	WR-75 Flange, 10.70-12.75 GHz
Co-Pol LNB	Refer to LNB spec

8.4. Stabilized Antenna Pedestal Assembly

Type:	Three-axis (Level, Cross Level, AZ)
Stabilization:	Torque Mode Servo
Stab Accuracy:	0.15 degrees RMS, 0.3 degrees MAX in presence of specified ship motions (see below).
Azimuth Motor:	Size 23 Brushless DC Servo, Double Stacked w/ Encoder
Level and Cross Level Motors,	Size 23 Brushless DC Servo w/ Brake
Inertial Reference:	3 Solid State Rate Sensors
Gravity Reference:	3 axis solid state accelerometer
AZ transducer:	256 line optical encoder / home switch
Pedestal Range of Motion:	
Elevation	-15 to +115
Cross Level (Inclined 30 degrees)	+/- 35 degrees
Azimuth	Unlimited
Elevation Pointing	+5 to +90 degrees at maximum specified roll
	+10 to +85 degrees at maximum combined roll & pitch
Maximum Ship Motions	
Roll:	+/-24 degrees at 8-12 sec periods
Pitch:	+/-14 degrees at 6-12 sec periods
Yaw:	+/-8 degrees at 15 to 20 sec periods
Turning rate:	Up to 12 deg/sec and 15 deg/sec/sec
Headway:	Up to 50 knots
Mounting height:	Up to 150 feet. See chart below
Heave	0.5G
Surge	0.2G
Sway	0.2G
Specified Ship Motions (for stabilization accuracy tests):	
Roll	+/- 20 degrees at 8 second period
Pitch	10 degrees FIXED
AZ Relative	0, 45, & 90 degrees with respect to roll input

PRELIMINARY



8.5. Radome Assembly, 66"

Type	Tuned "A" sandwich
Material	Composite foam/laminate
Size	
Diameter:	1.76 M (69.35 inch)
Height:	1.76 M (69.40 inch)
Hatch size	0.43 x 0.66 M (17 x 26 inch)
Installed weight	***MAX*** 600 lbs. (Including antenna pedestal).
RF attenuation	Less than 0.3 dB @ 10.7-12.75 GHz, dry
	Less than 0.3 @ 14.0-14.5 GHz, dry
Wind:	Withstand relative average winds up to 56 m/sec (125 mph) from any direction.
Ingress Protection Rating	All Sea Tel radomes have an IP rating of 56

PRELIMINARY

Maintenance – The radome must be kept clean and free of residues that will increase the RF attenuation.

Repair - Any cracks, scratches or other damage to the surface seal of the radome must be repaired and re-sealed by a competent "A" layered laminate (or cored deck) repair professional.

NOTE: Damage to the seal of the inside, or outside, of the radome can allow moisture to be absorbed. This will result in the radome being heavier and having higher attenuation. ***Do NOT drill holes in this radome.***

Disposal - Should it ever become necessary to dispose of the radome, it must be disposed of using the same handling procedures as other fiberglass materials.

8.6. Pedestal Control Unit

The PCU Assembly contains 2 Printed Circuit Boards (PCBs). One is the main control board and the other is the Motor Driver for the 3 Brushless DC Drive motors (AZ/EL/CL).

Connectors	
Antenna Reflector	15 Pin D-Sub connector
Motor Interface	15 Pin D-Sub connector
M&C Interface	SMA loop-through connectors
GPS Input	BNC connector
Controls	None
M&C Interface	9600 Baud 400MHz FSK

8.6.1. 400 MHz Unlimited Azimuth Modem/Multiplexer (3 Channel)

Combined Signals (-1,-2)	
Pass-Thru	950-3650 MHz RX IF,
Injected	22Khz Tone
	DC LNB Voltage Select
	400 MHz Pedestal M&C
Connectors:	
RX IF L-Band	SMA female
Rotary Joint	SMA female
RF / Ped M&C	9 pin D-Sub Connectors
Radio/Pedestal M&C	Radio & Pedestal Control
Modulation	FSK
Mode	Full Duplex
Frequencies	447-465 MHz
Diagnostics	LED Status Indicator for Power, Link communications and Self Test
Pedestal Interface	RS-232/422
Radio Interface (Jumper Selectable)	RS-232, RS-422 (4 wire) or RS-485 (2 wire)
ADE/BDE Mode	Jumper Selectable

PRELIMINARY

8.7. ADE Pedestal Power Requirements:

Antenna AC Input Power	110/220 VAC, 60/50 Hz, single phase
Antenna Power Consumption	450 Watts ***MAX (brake release, pedestal drive and 8W BUC drive)***

8.8. XX09 Environmental Specifications

8.8.1. Climatic Conditions

Environmental condition	Test Level
Temperature Range (Operating)	-25° to +55° Celsius (-13° to +131° F)
Humidity	100% Condensing
Wind Speed	56 m/sec (125 mph)
Solar Radiation	1,120 Watts per square meter, 55° Celsius

8.8.2. Chemically Active Substances

Environmental Condition	Test Level
Sea Salt	5 percent solution

8.8.3. Mechanical Conditions

Environmental Condition	Test Level			
Systematic Vibration Amplitude Acceleration Frequency Range	 5.0 millimeters 2.0 G (20 m/s2) 1Hz-150 Hz			
Shock (Transient Vibration) Response Spectrum Peak Accel., m/s2 Duration, ms	 I 100 11	 II 300 6	 III 500 6	
Number of Cycles Directional Changes	3 each direction 6			
Shock (Bump) Peak Accel., m/s2 Duration, ms Number of Cycles Directional Changes	 250 6 100 ea. direction 6			

PRELIMINARY

8.8.4. Transit Conditions

Environmental Condition	Test Level
Drop (Transit Shock)	30 G @ 8 inches

8.9. Below Decks Equipment

8.9.1. DAC-2202 Antenna Control Unit (ACU)

Refer to the DAC-2202 Manual for its specifications.

8.9.2. Terminal Mounting Strip (TMS)

Refer to the DAC-2202 Manual for the TMS specifications.

8.9.3. Satellite Modem

Please refer to the manufacturers I&O manual for this device.

8.9.4. Router

Please refer to the manufacturers I&O manual for this device.

8.10. Cables

8.10.1. Antenna Control Cable (Provided from ACU to the Base MUX)

RS-422 Pedestal Interface

Type	Shielded Twisted Pairs
Number of wires	4
Wire Gauge	24 AWG or larger
Communications Parameters:	9600 Baud, 8 bits, No parity
Interface Protocol:	RS-422
Interface Connector:	DE-9P

8.10.2. Antenna L-Band IF Coax Cables (Customer Furnished)

Due to the loss across the length of the RF coaxes at L-Band, Sea Tel recommends the following 50 ohm coax cable types (and their equivalent conductor size) for our standard pedestal installations. Type N male connectors installed on the cables **MUST be 50 Ohm connectors** for the center pin to properly mate with the female adapters we provide on the Base multiplexer panel and on the adapter bracket mounted inside the radome next to the breaker box.:

Run Length	Coax Type	Typical. Loss @ 1750Mhz	Shield isolation	Center Conductor Size	Installed Bend Radius	Tensile Strength
<100 ft	LMR-240	10.704 db per 100 ft(30.48 m)	>90db	0.056 In. (1.42 mm)	2.5 In. (63.5 mm)	80lb (36.3 kg)
up to 150 ft	LMR-400	5.571 db per 100 ft(30.48 m)	>90db	0.108 In. (2.74 mm)	4.0 in. (101.6 mm)	160lb (72.6 kg)
up to 200 ft	LMR-500	4.496 db per 100 ft(30.48 m)	>90db	0.142 In. (3.61 mm)	5.0 In. (127 mm)	260lb (118 kg)
Up to 300 ft	LMR-600	3.615 db per 100 ft(30.48 m)	>90db	0.176 In. (4.47 mm)	6.0 In. (152.4 mm)	350lb (158.9 kg)

PRELIMINARY

8.10.3. Multi-conductor Cables (Customer Furnished)

Due to the voltage loss across the multi-conductor cables, Sea Tel recommends the following wire gauge for the AC & DC multi-conductor cables used in our standard pedestal installations:

Run Length	Conductor Size
up to 50 ft	20 AWG (0.8 mm)
up to 100 ft	18 AWG (1.0 mm)
up to 150 ft	16 AWG (1.3 mm)
up to 250 ft	14 AWG (1.6 mm)
Up to 350 ft	12 AWG (2.0 mm)

9. DRAWINGS

The drawings listed below are provided as a part of this manual for use as a diagnostic reference.

9.1. 6009-33 Ku-Band Model Specific Drawings

Drawing	Title	
130288-104_A	System, 6009-33	9-3
130357-3_A	System Block Diagram, 6009-33	9-5
130401_A	Antenna System Schematic	9-9
130342-1_A	General Assembly, 6009-33	9-10
127625-2_A3	Antenna Assembly, 6009 Ku-Band	9-12
130296-1_A	PCU & PWS Mounting Assembly	9-14
130387-1_A	Codan BUC Mounting Assembly	9-16
129622-1_A	Waveguide Assembly, 6009-33	9-18
130307-1_X1	81" Radome Assembly, Tuned	9-20
130291-1_X2	81" Radome Base Frame Assembly	9-22
130450_A	Installation Arrangement	9-24

PRELIMINARY

9.2. Series 09 General Drawings

Drawing	Title	
129755_A	Pedestal Harness Schematic	9-26
119478-5_C3	Cable Assembly, RJ-45 Serial	9-27
121628-4_N2	Terminal Mounting Strip	9-28
129710-0_A	Base Multiplexer Panel	9-30

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PRELIMINARY

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	130342-1	A	GENERAL ASS'Y, 6009-33	
2	1 EA	130307-1	X1	RADOME ASS'Y, 81 INCH, WHITE, TUNED	
3	1 EA	130291-1	X2	RADOME BASE ASS'Y, 80.8 STEEL, WITH A	
4	0 EA	124167-X		(REF ONLY) SSPB, KU-BAND, LBUC, CODA	
5	0 EA	127386-X		(REF ONLY) LNB, SMW, QUAD L.O., KU BA	
6	1 EA	125411-3	H	DAC-2202, SCPC RCVR, 9 WIRE IF	(NOT SHOWN)
7	1 EA	129615-1	A	BELOW DECK KIT, L-BAND, W/ DAC 2202, 4	NOT SHOWN
9	1 EA	130289-1	A	CUSTOMER DOC PACKET, 6009-33	(NOT SHOWN)
11	1 EA	124766-1	A1	DECAL KIT, 76-81 IN RADOME, SEA TEL	(NOT SHOWN)
12	1 EA	121711	A	BALANCE WEIGHT KIT	(NOT SHOWN)
13	1 EA	130290-1	X1	SHIP STOWAGE KIT, XX09	(NOT SHOWN)
15	0 EA	123494-X		(REF ONLY) AIR CONDITIONER, R417A	

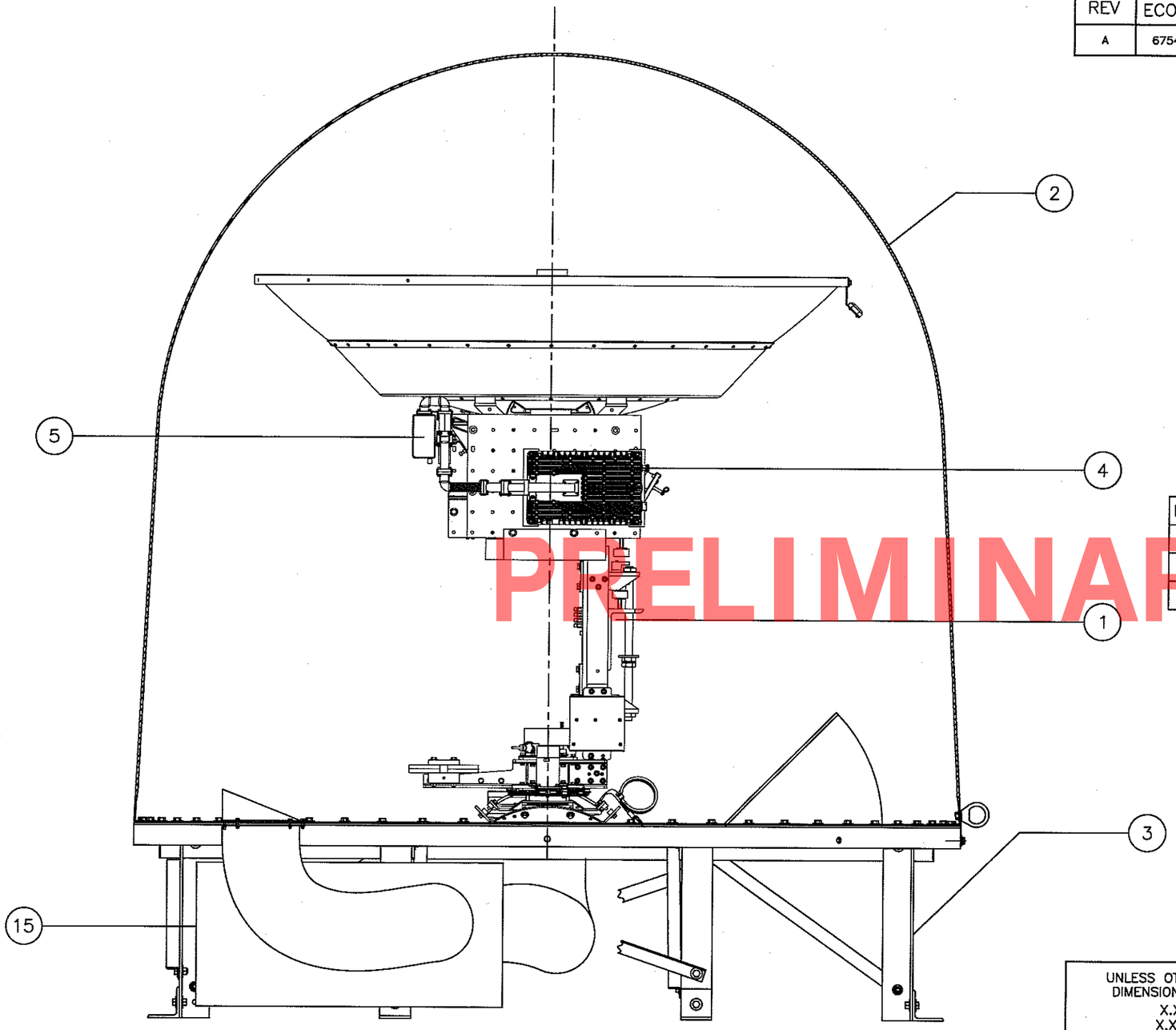
PRELIMINARY

Sea Tel
COBHAM

SYSTEM, 6009-33, LIN, 8-16W, QUAD, 81 IN, PPL, AC RDY

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
SERIES 09	09-Jul-09	1 OF 1	**130288-104**	**A**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	6754	07/07/09	RELEASED TO PRODUCTION WAS REVISION X1. SYSTEM BLOCK DIAGRAM WAS 130286.	KRB



PRELIMINARY

DASH#	BAND	POL	WATT	RF MFR	LNB	OTHER
-101	KU	LIN	8W	CODAN	QUAD	PPL
-102	KU	LIN	8W	CODAN	QUAD	PPL, NO BDE AC RDY
-104	KU	LIN	8W	CODAN	QUAD	PPL, AC RDY

REFERENCE DRAWINGS:

130357	SYSTEM BLOCK DIAGRAM.
130401	ANTENNA SYSTEM SCHEMATIC.
129755	ANTENNA PEDESTAL SCHEMATIC.
125804	INSTALLATION ARRANGEMENT.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5M - 1994

MATERIAL: N/A

FINISH: N/A

3rd ANGLE PROJECTION

DRAWN BY: KRB

DRAWN DATE: 05/13/09

APPROVED BY:

APPROVED DATE:

Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: SYSTEM, 6009-33
81 INCH RADOME

SIZE: B | SCALE: 1:12 | DRAWING NUMBER: 130288 | REV: A

FIRST USED: N/A | SHEET NUMBER: 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	130342-1	A	GENERAL ASS'Y, 6009-33	
4	1 EA	125651-3	H	FEED ASS'Y 6006KU, SMW LNB	
5	2 EA	127386-X		(REF ONLY) LNB, SMW, QUAD L.O., KU BA	
6	1 EA	124167-X		(REF ONLY) SSPB, KU-BAND, LBUC, CODA	
20	1 EA	115708-1	L	CIRCUIT BREAKER BOX ASS'Y, 220V	
21	1 EA	129308-1	B	PCU ENCLOSURE ASS'Y, XX09	
22	1 EA	129628-1	A2	ENCLOSURE ASS'Y, MOTOR JUNCTION X	
23	1 EA	121951-3	E	MOTOR, BLDC, 2 STACK W/ ENCODER, 20	
24	2 EA	125644-1	F	MOTOR, SIZE 23, BLDC W/ BRAKE, 15 PIN	
25	1 EA	125755-3	G	POWER SUPPLY ASS'Y, 48V, 300W W/D-S	
26	1 EA	125082	A	GPS ANTENNA, FURUNO	
27	1 EA	129543-24	A	CABLE ASS'Y, PROXIMITY SENSOR	
31	1 EA	129526-84	A	HARNESS ASS'Y, PCU TO MOTOR JUNCTI	
32	1 EA	129527-36	A	HARNESS ASS'Y, MOTOR TO ELEVATION,	
33	1 EA	128082-1	A	HARNESS ASS'Y, REFLECTOR, XX06	
34	1 EA	128536-84	A	CABLE ASS'Y, 48VDC TO CODAN SSPB, 84	
35	1 EA	129741-84	A	HARNESS, 400 MHZ MODEM TO CODAN S	
40	1 EA	129254-2	A3	POWER RING, 20A, 3 CIRCUITS, XX09	
41	1 EA	127583-64	A	CABLE ASSEMBLY, PEDESTAL, AC POWE	
42	1 EA	124288-36	F	CABLE ASS'Y, AC POWER, 36 IN	
43	1 EA	124288-24	F	CABLE ASS'Y, AC POWER, 24 IN	
51	2 EA	114972-4	M	CABLE ASS'Y, SMA(M) - SMA(M), 30 IN	
52	1 EA	114972-3	M	CABLE ASS'Y, SMA(M) - SMA(M), 84 IN	
53	1 EA	111079-8	G	CABLE ASS'Y, SMA(M)-N(M), 8 FT.	
54	1 EA	128385-12BLK	B	CABLE ASS'Y, RG-179, COAX, SMA (RA) T	
55	2 EA	117164-60BLK	A4	CABLE ASS'Y, RG-179 COAX, F TO F, 60 IN	

PRELIMINARY

SYSTEM BLOCK DIAGRAM, 6009-33

PROD FAMILY	EFF. DATE		DRAWING NUMBER	REV
LIT	09-Jul-09	SHT 1 OF 3	**130357-3**	**A**

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
60	2 EA	115492-1	C1	ADAPTER, N(F)-SMA(F), W/FLANGE	
61	1 EA	116466	D	ROTARY JOINT, 4.5 GHz, DUAL COAX.	
62	1 EA	128010-1	B	RF COAX SWITCH ASS'Y, 75 OHM	
70	1 EA	128059	B1	FILTER, TX REJECT, WR-75, 13.75-14.5 GH	
71	1 EA	126144-1	A1	WAVEGUIDE, WR-75, 180 DEG E-BEND	
80	1 EA	127280-2	A	WAVEGUIDE FILTER, KU-BAND, RX/REJEC	
81	1 EA	128534-3	A	WAVEGUIDE, WR-75, H-BEND W/ FULL FL	
82	1 EA	110172-24	G1	WAVEGUIDE, WR-75, 90 DEG E-BEND, 3.86	
83	1 EA	125157-1	A1	DIPLEXER, DPX75K-002, WR-75	
84	1 EA	128716-1	A	WAVEGUIDE, WR-75, KU BAND, 4006RZA	
85	1 EA	128290-1	A	WAVEGUIDE, WR-75, 180 DEG H-BEND W/	
86	1 EA	115477-6	C	WAVEGUIDE, WR-75, ROTARY JOINT, L-ST	
87	1 EA	126225-344	B	WAVEGUIDE SPACER, WR-75, .44 IN (7/16)	
100	1 EA	125411-3	H	DAC-2202, SCPC RCVR, 9 WIRE IF	
101	1 EA	129615-1	A	BELOW DECK KIT, L-BAND, W/ DAC 2202, 4	
102	1 EA	129710-1	A	BASE MUX RACK PANEL ASS'Y, 400MHZ,	
103	1 EA	121628-4	P	TERMINAL MOUNTING STRIP ASS'Y, ACU	
105	1 EA	129613-2	A	MODEM ASS'Y, 400MHZ FSK, 3 CH, BDE, R	
110	1 EA	113303-10	S	CABLE ASS'Y, SMA 90 - SMA (M), 8 IN	
111	1 EA	115384-3	E1	CABLE ASS'Y, SMA(M)-BNC(M), 72 IN.	
112	1 EA	111115-6	B	CABLE ASS'Y, F(M)-F(M), 6 FT.	75 OHM SATELLITE MODEM
112	1 EA	116700-6	F	CABLE ASS'Y, RG223, N(M)-F(M), 6 FT.	50 OHM SATELLITE MODEM
114	1 EA	116700-6	F	CABLE ASS'Y, RG223, N(M)-F(M), 6 FT.	75 OHM SATELLITE MODEM
114	1 EA	114973-72	E	CABLE ASS'Y, N(M)-N(M), 72 IN.	50 OHM SATELLITE MODEM
120	1 EA	115492-1	C1	ADAPTER, N(F)-SMA(F), W/FLANGE	
121	1 EA	110567-19		ADAPTER, N(F)-N(F), STRAIGHT, FLANGE	
122	1 EA	111003-18	C	ADAPTER, BNC(F)-F(M)	
130	1 EA	116298-1	F5	INTERFACE HARNESS ASS'Y, DUAL MODE	
131	1 EA	120643-25	B	CABLE ASS'Y, RS232, 9-WIRE, STRAIGHT,	

PRELIMINARY

SYSTEM BLOCK DIAGRAM, 6009-33

PROD FAMILY	EFF. DATE		DRAWING NUMBER	REV
LIT	09-Jul-09	SHT 2 OF 3	**130357-3**	**A**

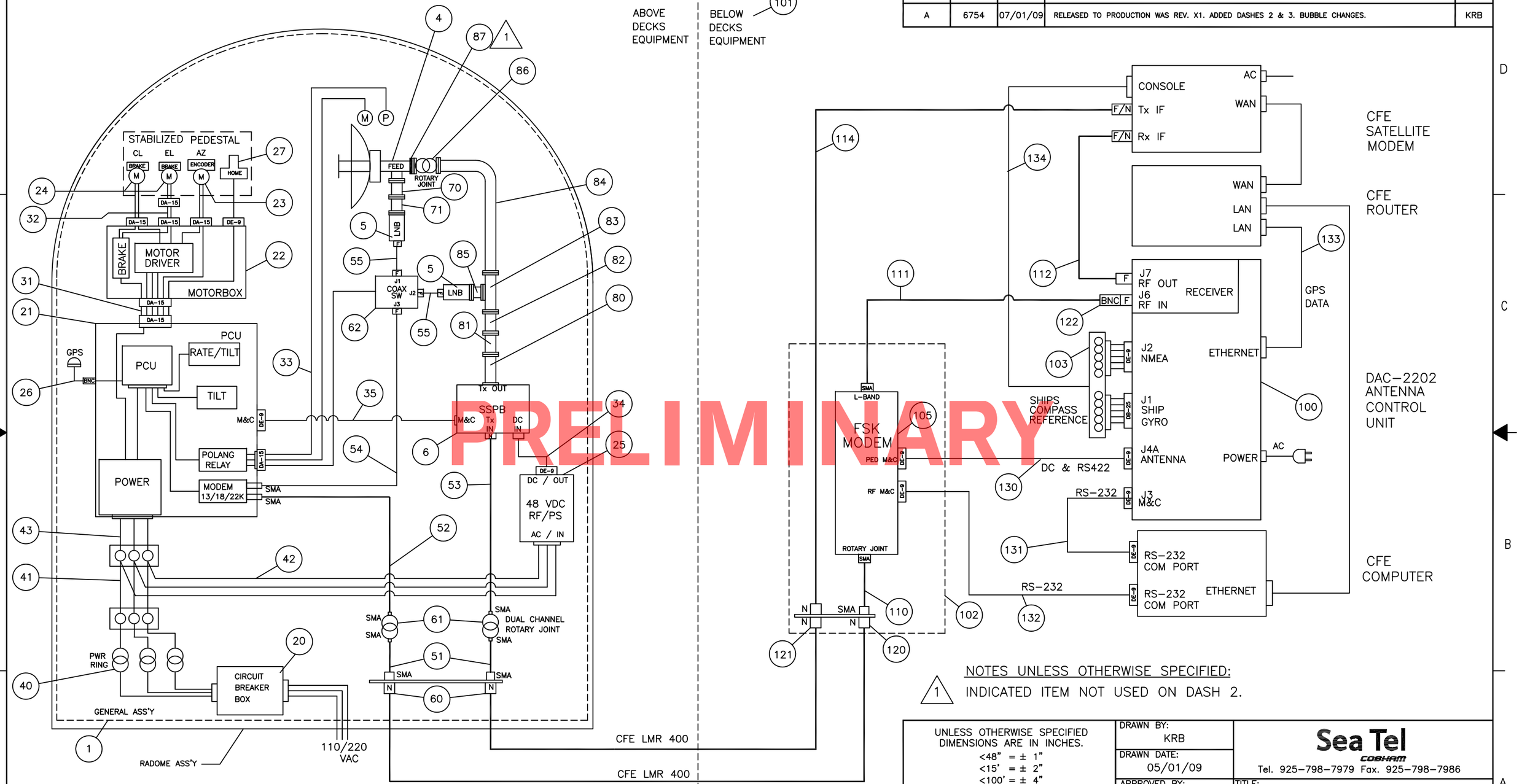
SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
132	1 EA	116298-3	F5	INTERFACE HARNESS ASS'Y, PC TO MOD	
133	1 EA	119479-10	B	CABLE ASS'Y, CAT5 JUMPER, 10 FT.	
134	1 EA	126877	B1	HARNESS ASS'Y, COMTECH MODEM INTE	COMTECH MODEM
134	1 EA	119478-5	C3	CABLE ASS'Y, RJ-45 SERIAL, 60 IN.	IDIRECT MODEM

PRELIMINARY

SYSTEM BLOCK DIAGRAM, 6009-33				
PROD FAMILY LIT	EFF. DATE 09-Jul-09	SHT 3 OF 3	DRAWING NUMBER **130357-3**	REV **A**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	6754	07/01/09	RELEASED TO PRODUCTION WAS REV. X1. ADDED DASHES 2 & 3. BUBBLE CHANGES.	KRB



PRELIMINARY

DASH #	SYSTEM
-1	5009-33
-2	4009-33
-3	6009-33

REFERENCE DRAWINGS

130401 ANTENNA SYSTEM SCHEMATIC
129755 ANTENNA PEDESTAL SCHEMATIC

NOTES UNLESS OTHERWISE SPECIFIED:

1 INDICATED ITEM NOT USED ON DASH 2.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
<48" = ± 1"
<15' = ± 2"
<100' = ± 4"
>100' = ± 6"
INTERPRET TOLERANCING PER ASME Y14.5M - 1994

MATERIAL: N/A

FINISH: N/A

3rd ANGLE PROJECTION

DRAWN BY: KRB
DRAWN DATE: 05/01/09
APPROVED BY:
APPROVED DATE:

SIZE: B
SCALE: NONE

Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: SYSTEM BLOCK DIAGRAM XX09-33

DRAWING NUMBER: 130357
REV: A

FIRST USED: 5009
SHEET NUMBER: 1 OF 1

REVISION RECORD				
REV	ECO#	DATE	DESCRIPTION	BY
A	NA	7/2/09	INITIAL RELEASE	SSS

PRELIMINARY

121880-1 MOTOR POLANG
RED
BLK
P/N 110927-2 2 PIN IDC
J2
J1
P/N 110927-6 6 PIN IDC
REFLECTOR HARNESS ASSEMBLY P/N 128082-1
115425-2 SCALAR SIDE POLANG
SLIDER
CCW
CW
GRY
RED
BRN
P/N: 111461-4 4 PIN IDC
MOTOR TERMINATION PCB ASSEMBLY
YEL
VIO/WHT
RED
GRY
BRN
BRN
BLK
ORG
WHT/BLU
DA-15P
POL+
POL-
+5V
POL
GND
GND
PWM
AUX
+15V
SHIELDED POL. AUX. RELAY PCB ASSY 166281-2
DA-15S
ENCLOSURE ASS'Y, PCU, XX09 129308-1
TRANSMIT REJECT FILTER
WR-75 E-BAND
CROSS POL Ku-BAND LNB
CO-POL LNB
TO AC SLIP RING
AC TERMINAL BLOCK
GRN/YEL
BLU
BRN
AC POWER MODULE
J1-MDA4 DA-15S
J1-16-PCU
J1-17-PCU
J1-31-PCU
J1-7-PCU
J1-5-PCU
J1-20-PCU
J1-18-PCU
J1-3-PCU
J1-19-PCU
J1-9-PCU
J1-24-PCU
J1-10-PCU
J1-39-PCU
J1-40-PCU
J1-41-PCU
PEDESTAL SCHEMATIC 129755
128536
P/N 125755-3
48V
GND
AC IN
LBUC SSPB CODAN
VDC
M&C
TXd
GND
N/C
RXd
129741-72
WHT
RED
BLK
DA-15S
MODEM
128010-1
RF SW RTN
C1
J1
J2
J3
L-BAND
ROTARY JOINT
SMA
Tx
Rx
DUAL CHANNEL ROTARY JOINT

REFERENCE DRAWINGS

129758 SCHEMATIC, PCU ENCLOSURE ASS'Y, XX09
129755 SCHEMATIC, PEDESTAL XX09
130357 SYSTEM BLOCK DIAGRAM XX09-33

DRAWN BY: SETH S		Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
DRAWN DATE: 4/22/09		TITLE: SCHEMATIC, ANTENNA, XX09-33	
APPROVED BY:			
APPROVED DATE: 7-2-09			
SIZE: D	SCALE:	DRAWING NO: 130401	REV: A
FIRST USED: XX09-33		SHEET: 1 OF 1	

SINGLE LEVEL MFG BILL OF MATERIAL

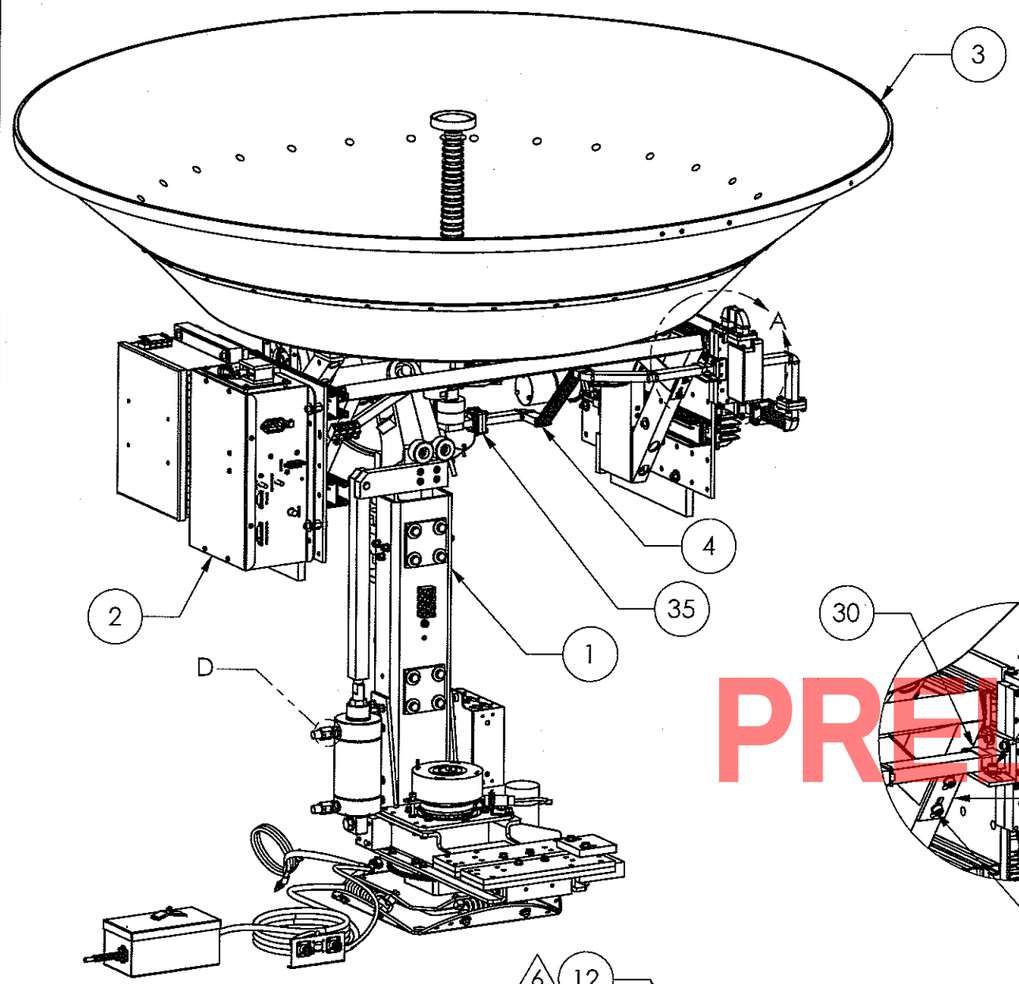
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	130292-1	B	PEDESTAL ASS'Y, 6009	
2	1 EA	130293-1	A	EQUIPMENT FRAME ASS'Y, 6009-23 & 33	
3	1 EA	127625-2	A3	ANTENNA INSTALL ASS'Y, 60 INCH KU, SM	
4	1 EA	130396-1	A	WAVEGUIDE ASS'Y, 6009-33	
5	1 EA	130063-1	A	INSTALL ASS'Y, GPS	
9	1 EA	130294-1	A	BALANCE WEIGHT KIT, AZ, 6009	
10	1 EA	130295-1	A	BALANCE WEIGHT KIT, EL & CL, 6009-33	
11	1 EA	121655-4	F	LABELS INSTALLATION, XX09	(NOT SHOWN)
12	12 IN	130043-12	A	TAPE, PIPE THREAD SEALANT, 1/2 IN WID	
30	1 EA	115998-2	J5	STRAP, RIGID WAVEGUIDE, KU-BAND	
31	1 EA	124393	B	BRACKET, RIGID WAVEGUIDE	
34	1 EA	118294-5	A3	HARDWARE KIT, WR-75, UG FLANGE, MET	
35	1 EA	118294-1	A3	HARDWARE KIT, WR-75, UG FLANGE, 6-32,	
60	4 EA	114593-164		SCREW, SOCKET HD, 10-32 x 1/2, S.S.	
67	4 EA	119952-011	A1	WASHER, STAR, INTERNAL TOOTH, #10, S	
68	2 EA	114580-011		WASHER, FLAT, #10, S.S.	
69	2 EA	114583-011	A	NUT, HEX, 10-32, S.S.	

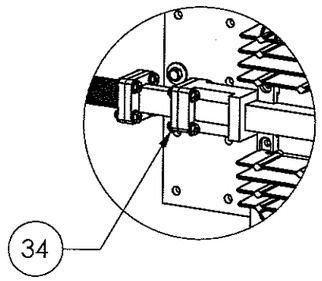
PRELIMINARY

GENERAL ASS'Y, 6009-33

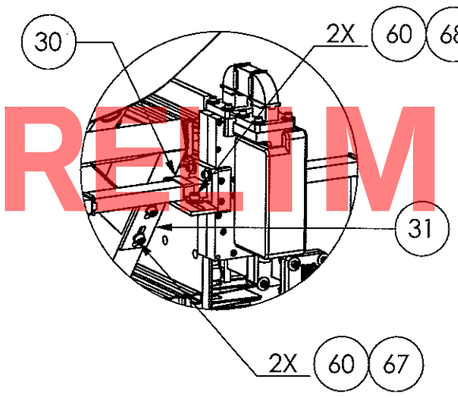
PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
SERIES 09	09-Jul-09	1 OF 1	**130342-1**	**A**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	6754	07/07/09	RELEASED TO PRODUCTION. WAS REVISION X2. ADDED ITEMS 9 & 10. CHANGED REFERENCE DRAWINGS.	KRB

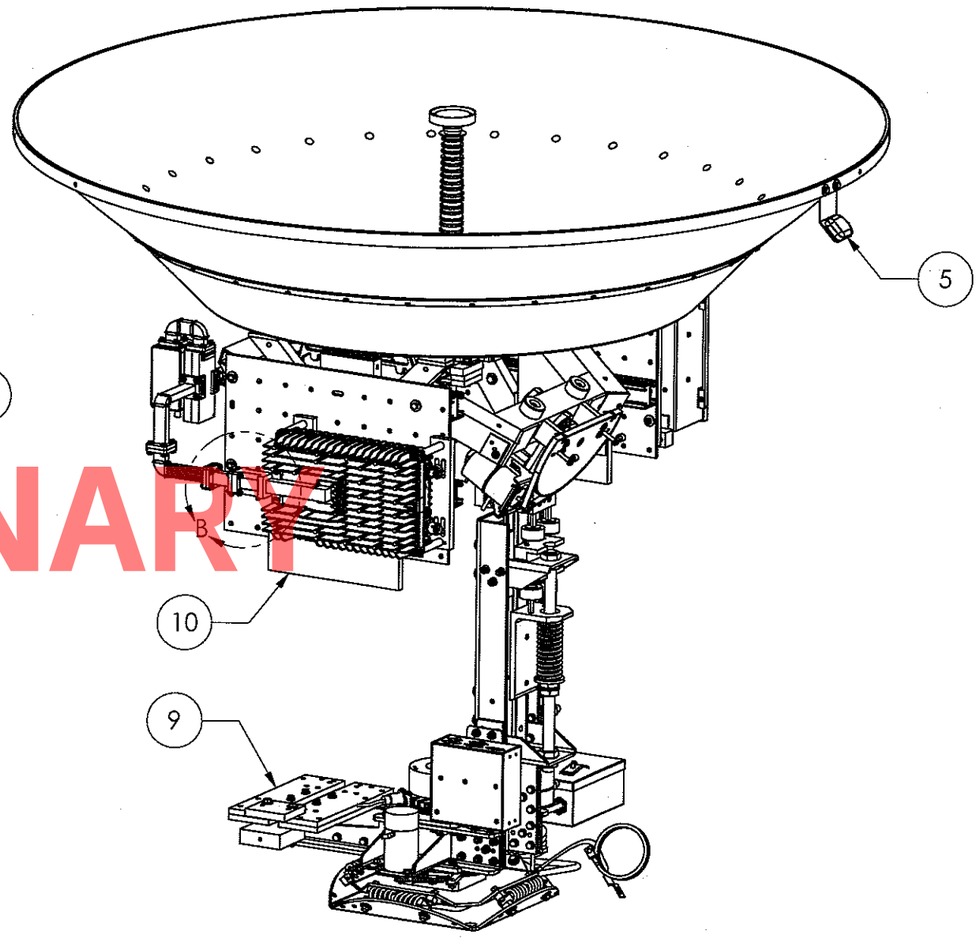


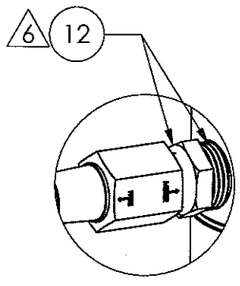


DETAIL B

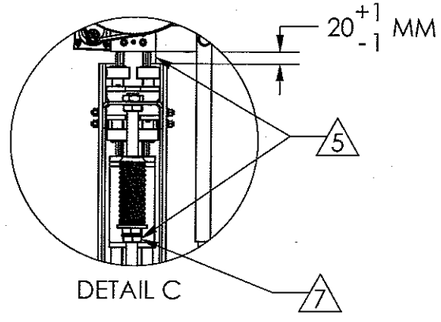


DETAIL A





DETAIL D



DETAIL C

REFERENCE DRAIWNGS:

130287 ANTENNA SYSTEM SCHEMATIC
130357 SYSTEM BLOCK DIAGRAM
129755 PEDESTAL SCHEMATIC

NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY ADHESIVE PER SEATEL SPEC. 121730.
2. TORQUE THREADED FASTENERS PER SEATEL SPEC. 122305.
3. TENSION ALL BELTS PER SEATEL SPEC. 122319.
4. ROUTE ALL HARNESS AND CABLE ASSEMBLIES PER SEATEL SPEC. 121872.

5 SET 20 MM GAP AS SHOWN BETWEEN YOKE BOTTOM AND PEDESTAL FRAME. TO ACHIEVE THIS GAP USE SHOWN NUT SET TO MOVE YOKE UP OR DOWN.

6 AFTER COMPLETION OF NOTE 5 INSTALL ADAPTERS AND CHECK VALVES (METER SIDE IN, READ ON VALVES) PROVIDED WITH PEDESTAL USING ITEM 12 ON EACH PIECE (ADAPTERS AND CHECK VALVES). WRAP 2-3 TIMES AROUND EXTERNAL THREADS FOR PROPER SEAL. MUST NOT USE LOCTITE FOR THESE PARTS.

7 AFTER ADJUSTING GAP PER NOTE 5 SECURE LOWER JAM NUT WITH LOCTITE 222.

PRELIMINARY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5M - 1994

MATERIAL: N/A

FINISH: N/A

3rd ANGLE PROJECTION

DRAWN BY: KRB
DRAWN DATE: 05/08/09
APPROVED BY:
APPROVED DATE: 7/8/09

SIZE: B | SCALE: 1:10

FIRST USED: 6009-33

Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: GENERAL ASS'Y 6009-33

DRAWING NUMBER: 130342 | REV: A

SHEET NUMBER: 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

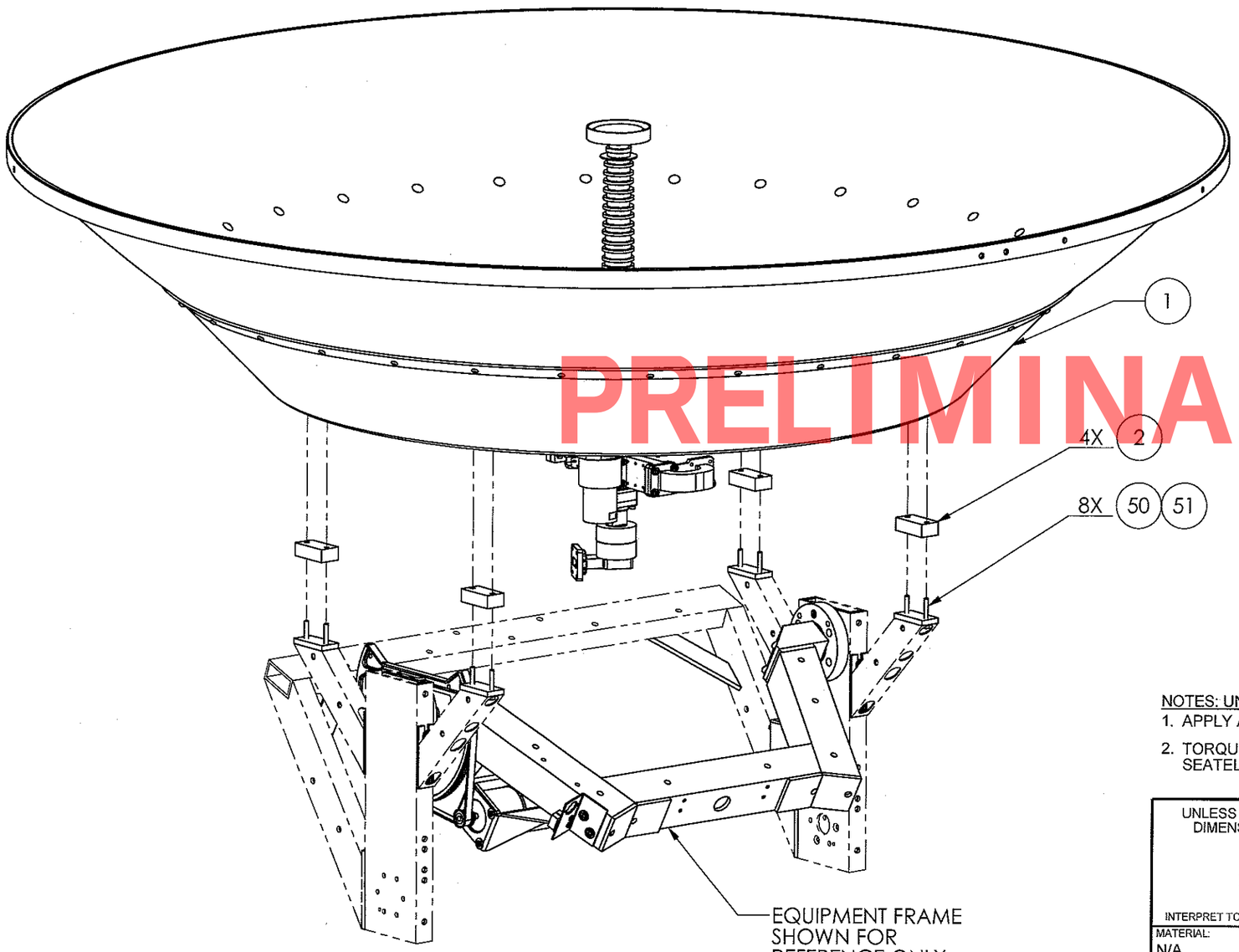
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	125650-2	D	ANTENNA ASS'Y, 6006 KU-BAND, SMW LN	
2	4 EA	125488-4	A1	SPACER, REFLECTOR BRACE, 0.625 IN	
50	8 EA	114593-171		SCREW, SOCKET HD, 10-32 x 1-1/2, S.S.	
51	8 EA	114580-011		WASHER, FLAT, #10, S.S.	

PRELIMINARY

ANTENNA INSTALL ASS'Y, 60 INCH KU, SMW LNB

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	09-Jul-09	1 OF 1	**127625-2**	**A3**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	N/A	04/07/08	RELEASE TO PRODUCTION, WAS REV X1. EQUIPMENT FRAME WAS SHOWN IN C-BAND CONFIGURATION.	KRB
A1	N/A	10/24/08	ADDED DASH TABLE.	KRB
A2	6626	04/21/09	ADDED DASH 3.	KRB
A3	6754	07/07/09	RENAMED DRAWING. WAS 6000 KU-BAND.	KRB



PRELIMINARY

DASH	DESCRIPTION
-1	FOR NJRC LNB
-2	FOR SMW LNB
-3	FOR EXT. REF. LNB

NOTES: UNLESS OTHERWISE SPECIFIED
1. APPLY ADHESIVE PER SEATEL SPEC. 121730.
2. TORQUE THREADED FASTENERS PER SEATEL SPEC. 122305.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5M - 1994

MATERIAL: N/A

FINISH: N/A

DRAWN BY: Simon L

DRAWN DATE: 03/24/08

APPROVED BY:

APPROVED DATE: 7/31/09

Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: ANTENNA ASS'Y, INSTALLATION, 60 INCH KU-BAND

SIZE: B | SCALE: 1:6 | DRAWING NUMBER: 127625 | REV: A3

3rd ANGLE PROJECTION

FIRST USED: 6006

SHEET NUMBER 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

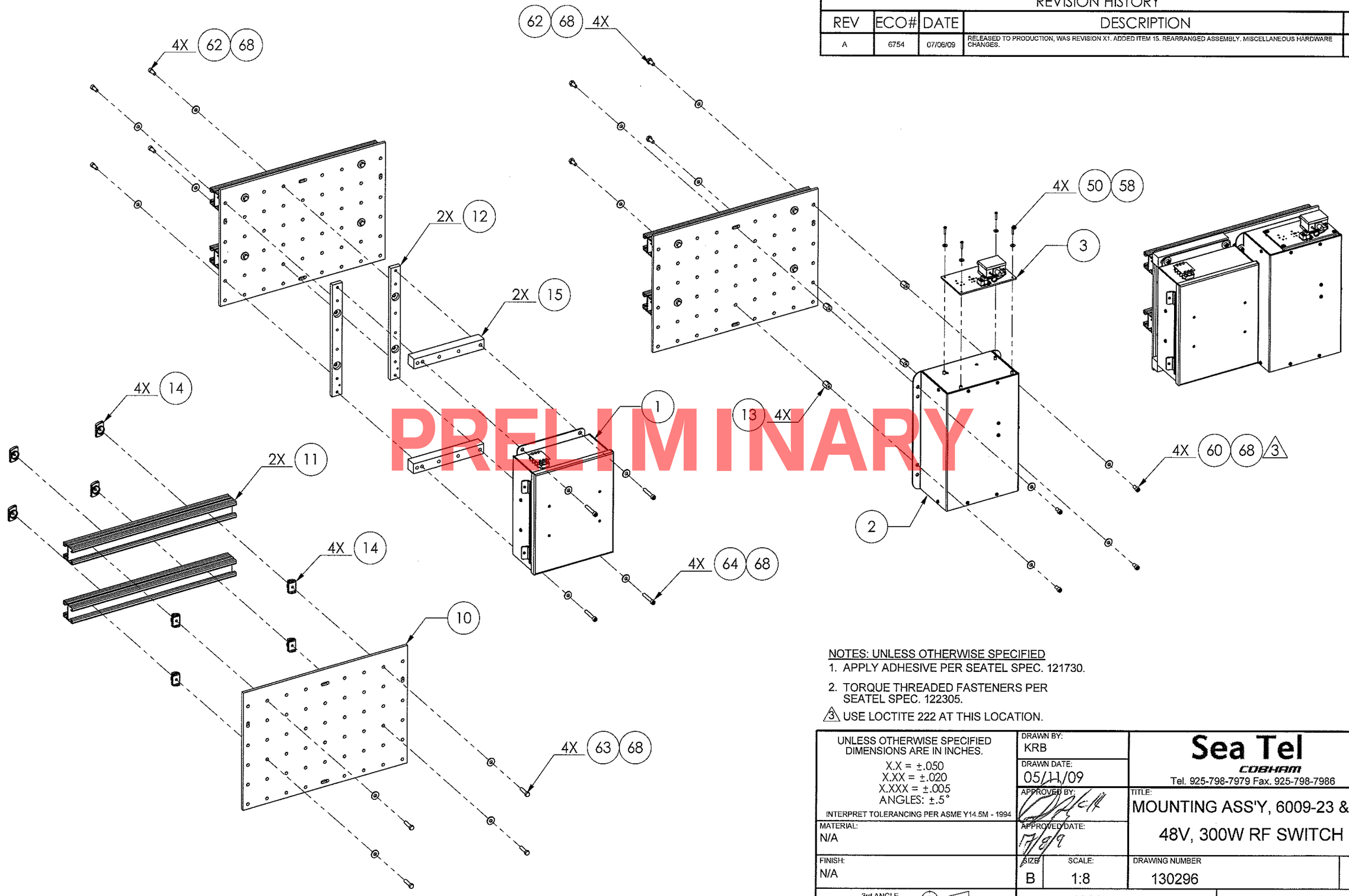
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	125755-3	G	POWER SUPPLY ASS'Y, 48V, 300W W/D-S	
2	1 EA	129308-1	B	PCU ENCLOSURE ASS'Y, XX09	
3	1 EA	128010-1	B	RF COAX SWITCH ASS'Y, 75 OHM	
10	1 EA	123861	A2	MOUNTING PLATE	
11	2 EA	126288-17	A	UNISTRUT, 1-5/8 H-CHANNEL, 17 IN, AL	
12	2 EA	116018-1	G	BRACKET, PSU MOUNTING	
13	4 EA	124588-1021	A	STANDOFF, HEX, F/F, 1/4-20 X .50 OD X 0.6	
14	8 EA	126279-3	A	NUT, 1 5/8 UNISTRUT, 1/4-20, W/SPRING, S	
15	2 EA	113684	B	COUNTERWEIGHT	
50	4 EA	119745-118		SCREW, PAN HD, PHIL, M3 X 8, S S	
58	4 EA	114580-210		WASHER, FLAT, M3, S.S.	
60	4 EA	114593-202		SCREW, SOCKET HD, 1/4-20 x 3/8, S.S.	
62	8 EA	114586-536		SCREW, HEX HD, 1/4-20 x 5/8, S.S.	
63	4 EA	114586-538		SCREW, HEX HD, 1/4-20 x 1, S.S.	
64	4 EA	114586-541		SCREW, HEX HD, 1/4-20 x 1-1/2, S.S.	
68	20 EA	114580-029		WASHER, FLAT, 1/4, S.S.	

PRELIMINARY

MOUNTING ASS'Y, 6009-33, 13/18V + TONE/RF SWITCH

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	09-Jul-09	1 OF 1	**130296-1**	**A**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	6754	07/06/09	RELEASED TO PRODUCTION, WAS REVISION X1. ADDED ITEM 15. REARRANGED ASSEMBLY. MISCELLANEOUS HARDWARE CHANGES.	KRB



PRELIMINARY

NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY ADHESIVE PER SEATEL SPEC. 121730.
2. TORQUE THREADED FASTENERS PER SEATEL SPEC. 122305.

△3 USE LOCTITE 222 AT THIS LOCATION.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994	DRAWN BY: KRB	Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
	DRAWN DATE: 05/11/09		
	APPROVED BY:	TITLE: MOUNTING ASS'Y, 6009-23 & 33 48V, 300W RF SWITCH	
MATERIAL: N/A	APPROVED DATE: 7/8/9		
FINISH: N/A	SIZE: B	SCALE: 1:8	DRAWING NUMBER: 130296 REV: A
3rd ANGLE PROJECTION	FIRST USED: 6009		SHEET NUMBER: 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

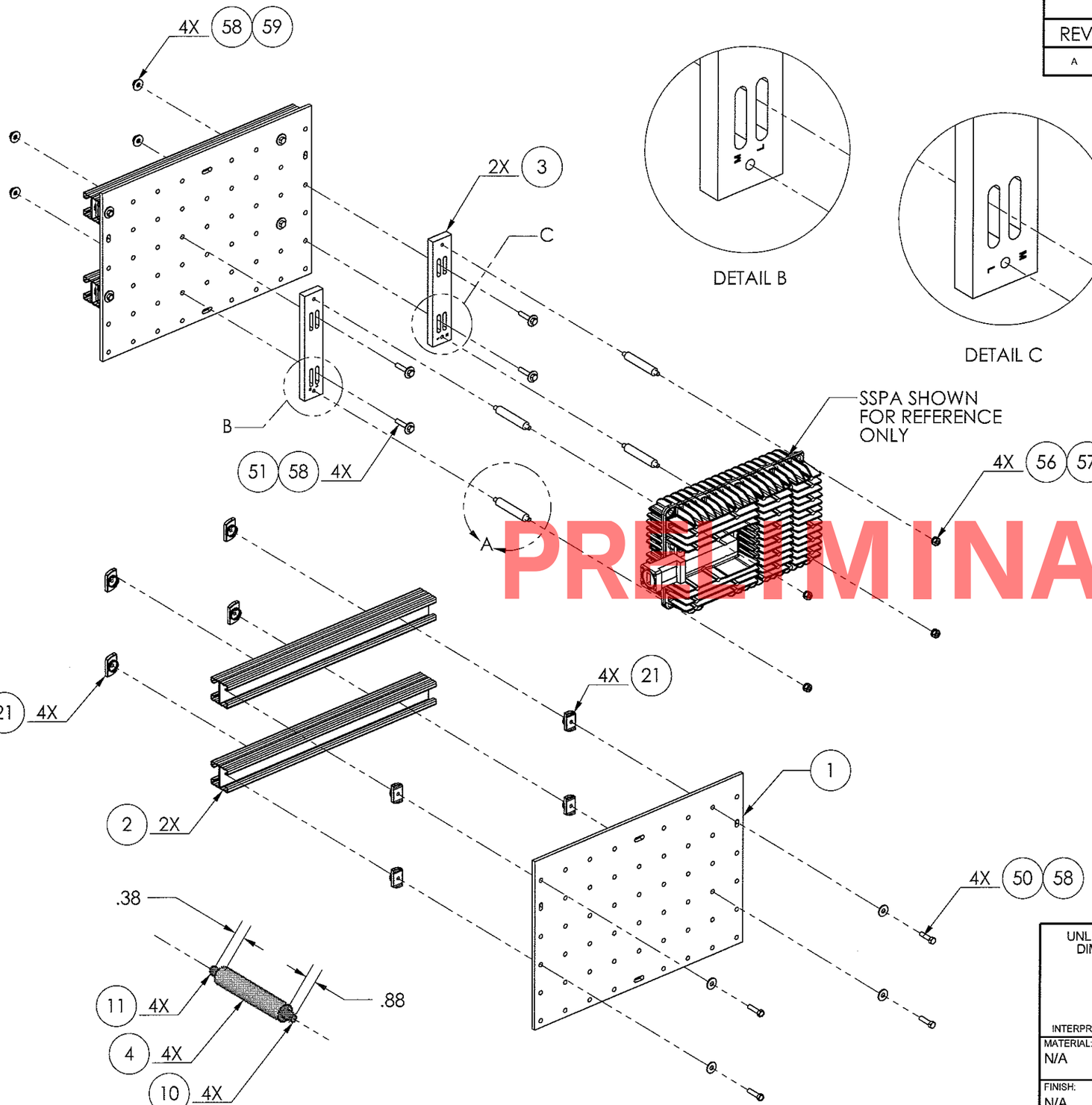
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	123861	A2	MOUNTING PLATE	
2	2 EA	126288-17	A	UNISTRUT, 1-5/8 H-CHANNEL, 17 IN, AL	
3	2 EA	124716	A	RF INTERFACE, BAR, CODAN, BUC	
4	4 EA	118328-4	C	STANDOFF, RND, F/F, 1/4-20 X .5 OD X 2.6	
10	4 EA	114592-544		STUD, FULLY THREADED, 1/4-20 x 1-1/4, S.	
11	4 EA	114592-540		STUD, FULLY THREADED, 1/4-20 x 3/4, S.S.	
21	8 EA	126279-3	A	NUT, 1 5/8 UNISTRUT, 1/4-20, W/SPRING, S	
50	4 EA	114586-538		SCREW, HEX HD, 1/4-20 x 1, S.S.	
51	4 EA	114586-540		SCREW, HEX HD, 1/4-20 x 1-1/4, S.S.	
56	4 EA	114580-027		WASHER, FLAT, 1/4, SMALL PATTERN, S.S	
57	4 EA	114581-029		WASHER, LOCK, 1/4, S.S	
58	12 EA	114580-029		WASHER, FLAT, 1/4, S.S.	
59	8 EA	114583-029		NUT, HEX, 1/4-20, S.S.	

PRELIMINARY

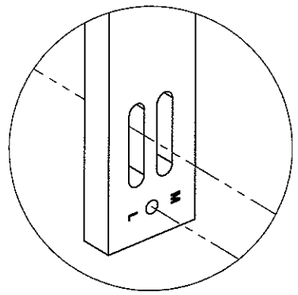
MOUNTING ASS'Y, CODAN LBUC, 6009-33

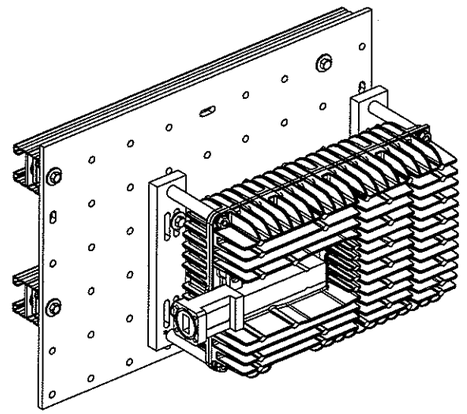
PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	09-Jul-09	1 OF 1	**130387-1**	**A**

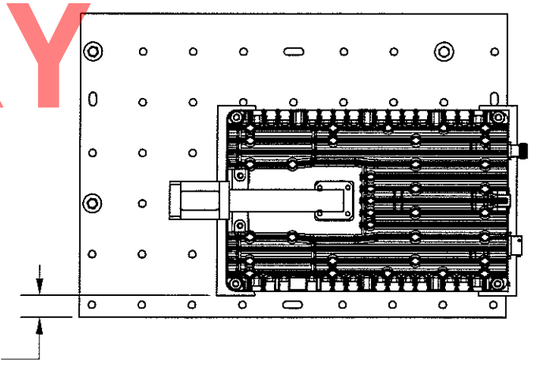
REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	6754	07/06/09	RELEASED TO PRODUCTION, WAS REVISION X1. DELETED ITEM 22. REARRANGED COMPONENTS.	KRB



DETAIL B


DETAIL C





PRELIMINARY

NOTES: UNLESS OTHERWISE SPECIFIED
1. APPLY ADHESIVE PER SEATEL SPEC. 121730.
2. TORQUE THREADED FASTENERS PER SEATEL SPEC. 122305.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994	DRAWN BY: KRB	Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
	DRAWN DATE: 05/11/09		
	APPROVED BY:	TITLE: MTG ASS'Y, CODAN LBUC, 6009-23 & 33	
MATERIAL: N/A	APPROVED DATE: 7/8/09		
FINISH: N/A	SIZE: B / SCALE: 1:7	DRAWING NUMBER 130387	REV A
3rd ANGLE PROJECTION	FIRST USED: 6009-33	SHEET NUMBER 1 OF 1	

SINGLE LEVEL MFG BILL OF MATERIAL

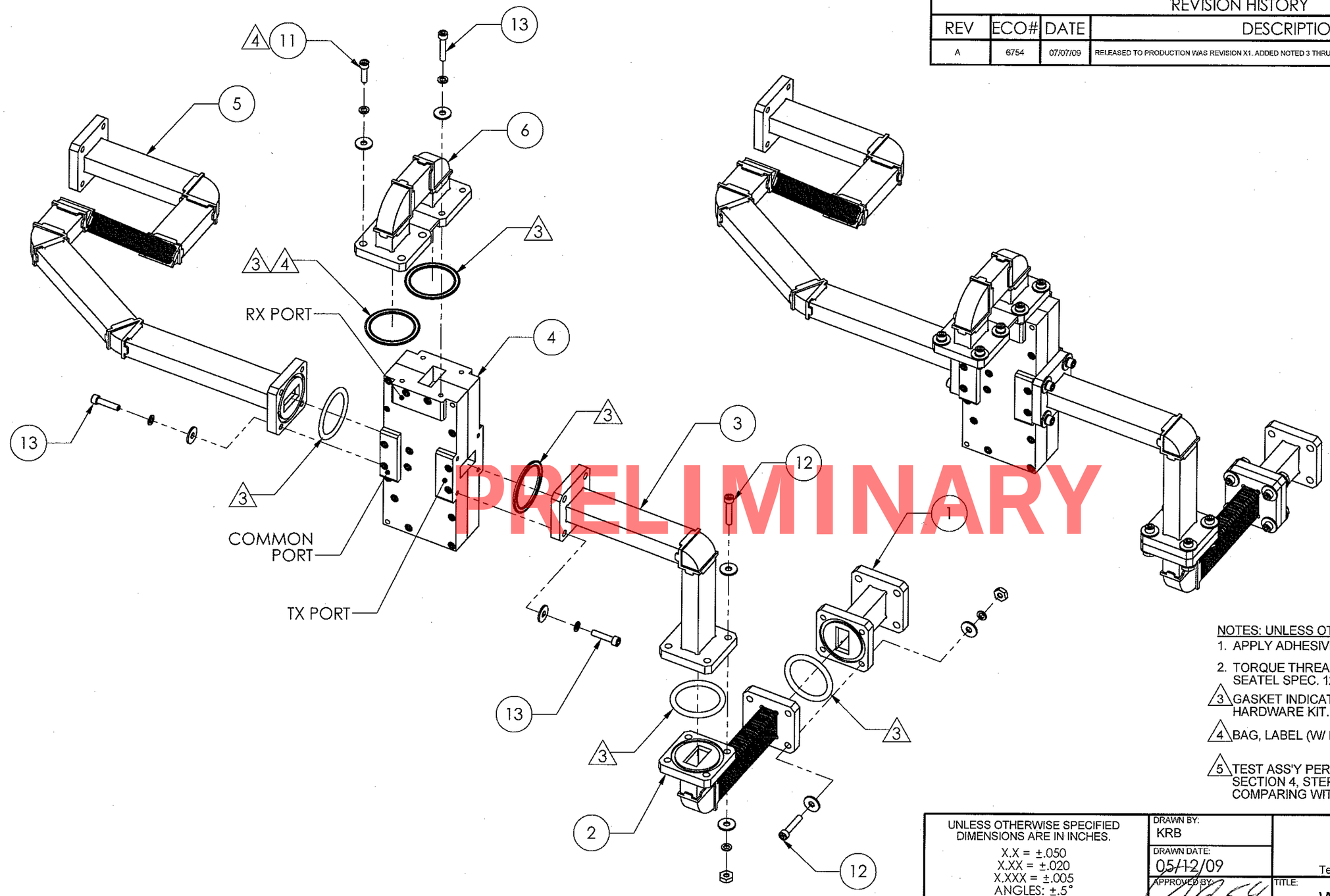
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	127280-2	A	WAVEGUIDE FILTER, KU-BAND, RX/REJEC	
2	1 EA	128534-3	A	WAVEGUIDE, WR-75, H-BEND W/ FULL FL	
3	1 EA	110172-24	G1	WAVEGUIDE, WR-75, 90 DEG E-BEND, 3.86	
4	1 EA	125157-1	A1	DIPLEXER, DPX75K-002, WR-75	
5	1 EA	128716-1	A	WAVEGUIDE, WR-75, KU BAND, 4006RZA	
6	1 EA	128290-1	A	WAVEGUIDE, WR-75, 180 DEG H-BEND W/	
7	3 EA	119269-1	A1	GASKET, WR-75, (UG HALF)	
11	1 EA	118294-6	A3	HARDWARE KIT, WR-75, UG FLANGE, M4	
12	2 EA	118294-13	B3	HARDWARE KIT, WR-75, UG FLANGE, M4,	
13	3 EA	118294-12	B1	HARDWARE KIT, WR-75, UG FLANGE, BLIN	

PRELIMINARY

WAVEGUIDE ASS'Y, 6009-33

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	09-Jul-09	1 OF 1	**130396-1**	**A**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	6754	07/07/09	RELEASED TO PRODUCTION WAS REVISION X1. ADDED NOTED 3 THRU 5. MISCELLANEOUS HARDWARE CHANGES.	KRB



PRELIMINARY

NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY ADHESIVE PER SEATEL SPEC. 121730.
2. TORQUE THREADED FASTENERS PER SEATEL SPEC. 122305.
3. GASKET INDICATED IS PART OF WAVEGUIDE HARDWARE KIT.
4. BAG, LABEL (W/ PART #) AND ATTACH TO ASS'Y.
5. TEST ASS'Y PER PROCEDURE 124283, PAGE 8, SECTION 4, STEP M, 1 & 2 TO QUALIFY COMPARING WITH TYPICAL LOSS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5M - 1994

MATERIAL: N/A

FINISH: N/A

3rd ANGLE PROJECTION

DRAWN BY: KRB

DRAWN DATE: 05/12/09

APPROVED BY:

APPROVED DATE: 7/8/09

Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: WAVEGUIDE ASS'Y, 6009-33

SIZE: B | SCALE: 2:5

DRAWING NUMBER: 130396 | REV: A

FIRST USED: 6009-33

SHEET NUMBER: 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

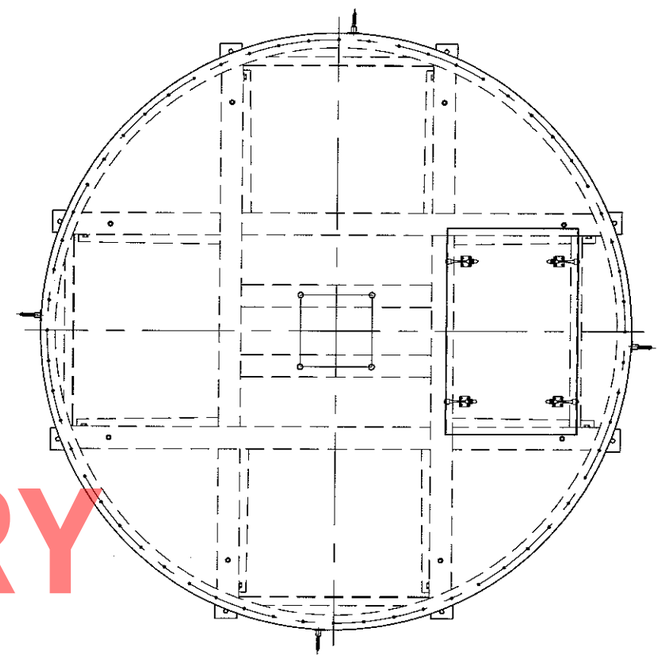
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	130306-1	X1	81 INCH, RADOME FABRICATION, TUNED	
2	1 EA	120881	A	HARDWARE KIT, 80.8 INCH RADOME	
3	3 EA	117762-1	B	SILICONE ADHESIVE, WHT RTV 122, 10.1	

PRELIMINARY

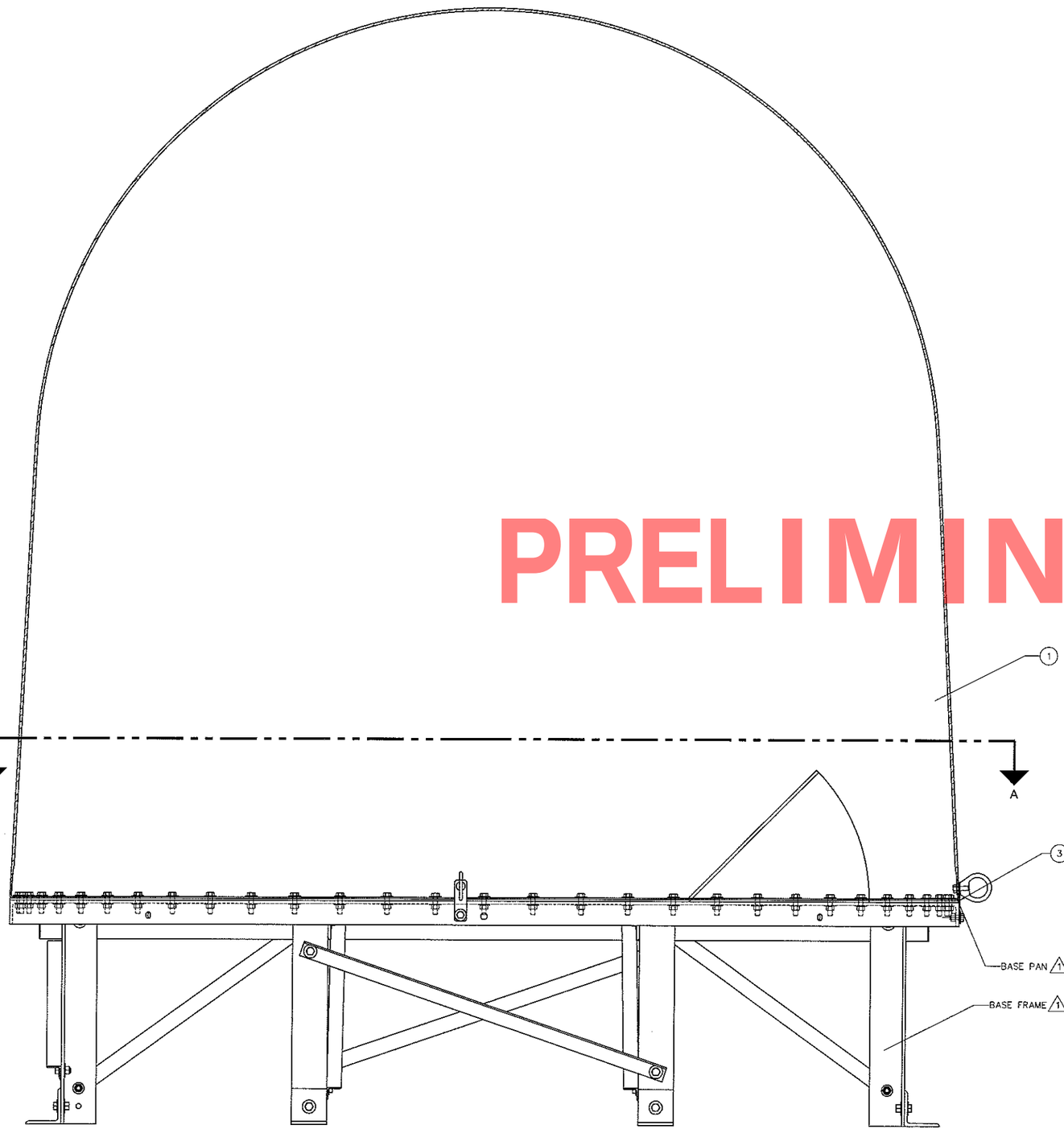
RADOME ASS'Y, 81 INCH, WHITE, TUNED

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	09-Jul-09	1 OF 1	**130307-1**	**X1**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
D1	–	6-28-05	-5 ADDED	LAE
D2	–	9-6-06	ADDED DASH 6 & 7	LAE
E	6451	11-20-08	ITEM 3 WAS 117762-4, DASH 1 ONLY.	SL



SECTION A-A
SCALE: 1:10



PRELIMINARY

DASH NO	DESCRIPTION
-1	~~CERAMIC~~ WHITE
~~-2~~ xx	KA-BAND, GREY
~~-3~~ XX	CERAMIC GREY
-4	FRENCH NAVY GREY
-5	BRAZILIAN NAVY GREY
-6	WINDOW GREY, MATTE FINISH
-7	TRAFFIC BLACK, MATTE FINISH

rwk 04/03/09

NOTES:
1. SEE SYSTEM DRAWING FOR P/N.
2. SEE HARDWARE KIT FOR ASSEMBLY INSTRUCTIONS.
3. REFERENCE INFORMATION:
   WIND SHEAR: 600 LBS.
   OVERTURNING MOMENT: 3000 FT-LBS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5M - 1994

MATERIAL: SEE BOM

FINISH:

3rd ANGLE PROJECTION

DRAWN BY: DY
DRAWN DATE: 6-5-05
APPROVED BY:
APPROVED DATE:

SIZE: B
SCALE: 1:10

FIRST USED: ~~80.8~~ SEAMLESS RADOME

Sea Tel
COBHAM
Tel. 925-798-7979 Fax. 925-798-7986

TITLE: RADOME ASS'Y, 81" Radome, Tuned ~~MODEL 80.8~~

DRAWING NUMBER: ~~119858~~ 130307
REV: ~~E~~ X1

SHEET NUMBER: 1 OF 1

DOCUMENT NO. 124225-4_A

SINGLE LEVEL MFG BILL OF MATERIAL

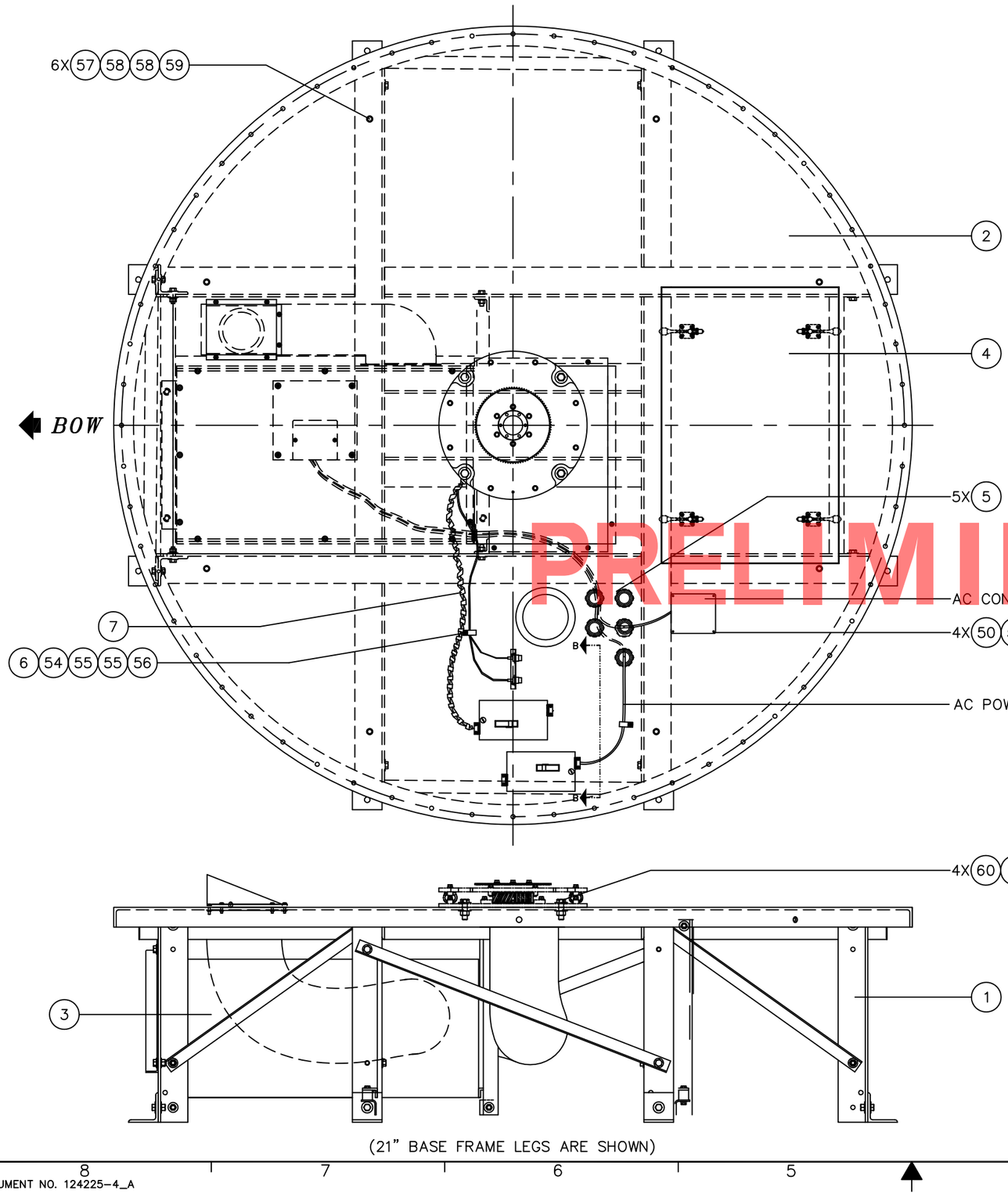
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	119707-1	B	BASE FRAME ASS'Y, 80.8 INCH, STEEL, 21	
2	1 EA	124460-1	A1	RADOME BASE FAB, 80.8 INCH, WHITE, A/	
3	1 EA	123729-2	D2	A/C INSTALL ASS'Y, EXTERNAL	
4	1 EA	120191-2	C2	RADOME PAN ACCESS ASS'Y, WHITE	
5	5 EA	124903-1	B1	STRAIN RELIEF ASS'Y	
6	3 EA	111679-25	0	CABLE CLAMP, NYLON, 3/4 DIA, #10 MTG	
7	48 IN	108955-10		SPIRAL WRAP, BLACK, 3/8	
9	6 EA	121226-7014		SPACER, #10 X .38 OD X .13, ALUM, ALODI	
10	1 EA	130524-1	X2	BRACKET, AC CONTROLLER	
51	2 EA	114588-150		SCREW, PAN HD, PHIL, 6-32 x 5/8, S.S.	
52	4 EA	114580-007		WASHER, FLAT, #6, S.S.	
53	2 EA	114583-007		NUT, HEX, 6-32, S.S.	
54	1 EA	114588-831		SCREW, PAN HD, PHIL, 10-32 x 3/4, S.S.	
55	14 EA	114580-011		WASHER, FLAT, #10, S.S.	
56	7 EA	114583-011	A	NUT, HEX, 10-32, S.S.	
57	6 EA	114622-546		SCREW, HEX HD, FULL THRD, 1/4-20 x 1-1/	
58	12 EA	114625-107		WASHER, FENDER, 1/4, (1 IN OD), S.S.	
59	8 EA	114583-029		NUT, HEX, 1/4-20, S.S.	
60	4 EA	114586-675		SCREW, HEX HD, 1/2-13 x 1-3/4, S.S.	
61	8 EA	114580-033		WASHER, FLAT, 1/2, S.S.	
62	4 EA	114583-033		NUT, HEX, 1/2-13, S.S.	
63	6 EA	114588-832		SCREW, PAN HD, PHIL, 10-32 x 7/8, S.S.	
64	4 EA	117762-1	B	SILICONE ADHESIVE, WHT RTV 122, 10.1	
65	2 EA	114588-535		SCREW, PAN HD, PHIL, 1/4-20 x 3/8, S.S.	
66	4 EA	114580-029		WASHER, FLAT, 1/4, S.S.	

PRELIMINARY

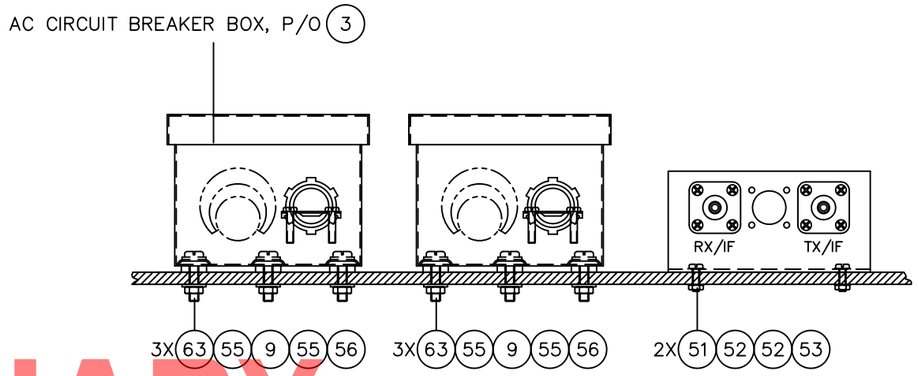
RADOME BASE ASS'Y, 80.8 STEEL, WITH AC

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	09-Jul-09	1 OF 1	**130291-1**	**X2**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY



(21" BASE FRAME LEGS ARE SHOWN)



SECTION B–B
SCALE 2:3

PRELIMINARY

NOTES, UNLESS OTHERWISE SPECIFIED:
1. APPLY ADHESIVE PER SEA TEL SPEC. 121730.
2. BAG AND ATTACH SPECIFIED HARDWARE.

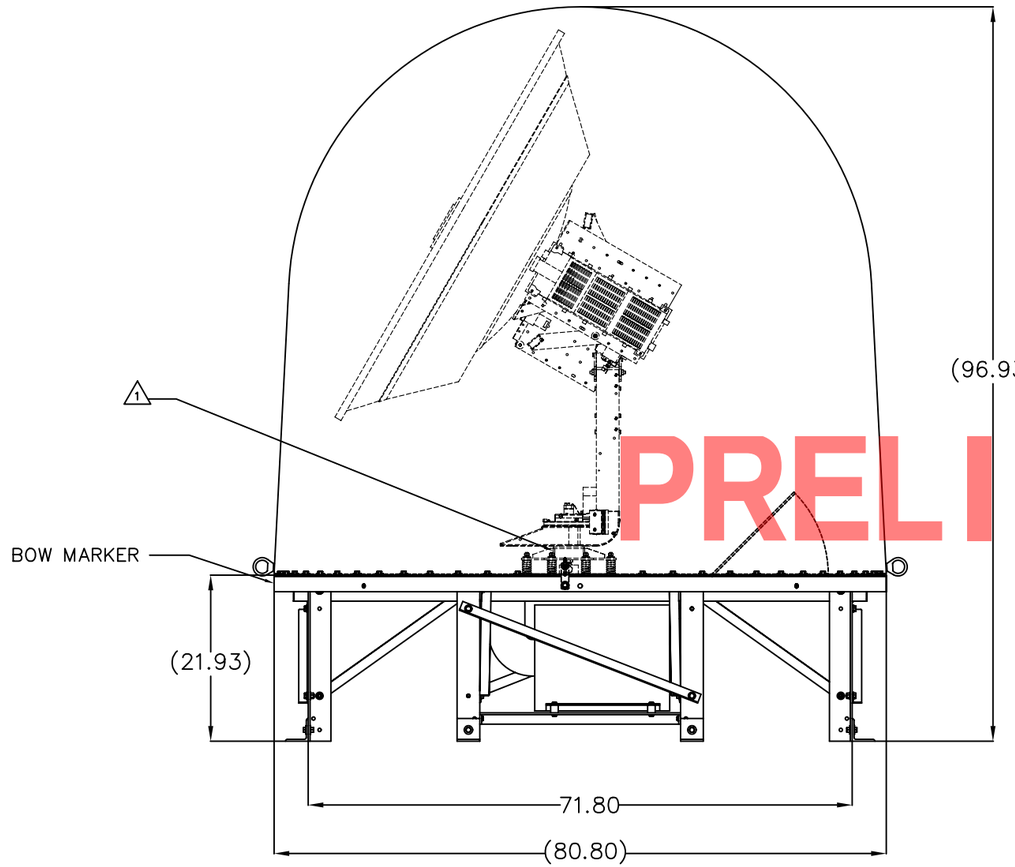
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050, X.XX = ±.020, X.XXX = ±.005, ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M – 1994	DRAWN BY: KRB	Sea Tel (COBHAM) Tel. 925-798-7979 Fax. 925-798-7986	
	DRAWN DATE: 05/13/09		
	APPROVED BY:	TITLE: RADOME BASE ASSY, 80.8 INCH, W/ AC	
MATERIAL: N/A	APPROVED DATE:		
FINISH: N/A	SIZE: B / SCALE: 1:12	DRAWING NUMBER: 130291	REV: X1
3rd ANGLE PROJECTION	FIRST USED: 6009	SHEET NUMBER: 1 OF 1	

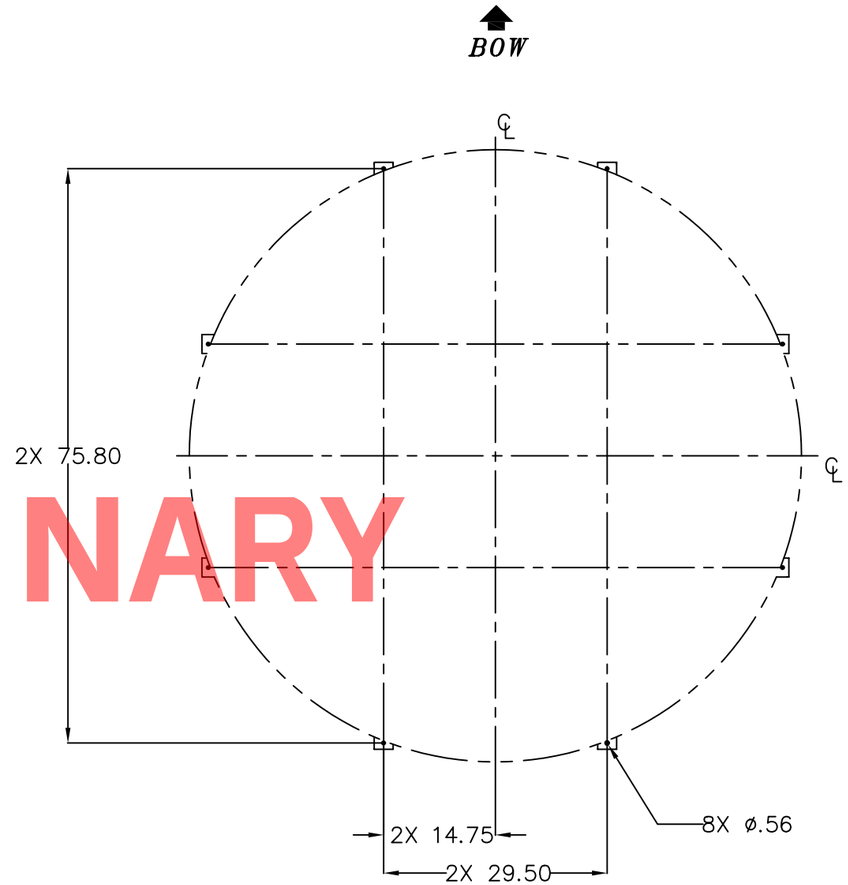
DOCUMENT NO. 124225-4_A

NOTES: UNLESS OTHERWISE SPECIFIED

⚠1 'BOW' WILL BE INDICATED ON SYSTEM. TO VERIFY, CHECK THAT THE LOWER AZ STOP PIN ON THE GA IS BOW SIDE OF CENTERLINE.

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	N/A	11-06-06	RELEASED TO PRODUCTION FROM REV. X1.	TP





MOUNTING HOLE PATTERN

PRELIMINARY

TOLERANCES UNLESS OTHERWISE SPECIFIED X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994	DRAWN BY: T PATEL DRAWN DATE: 09-01-06 APPROVED BY: APPROVED DATE:	Sea Tel® 4030 NELSON AVENUE CONCORD, CA 94520 Tel. 925-798-7979 Fax. 925-798-7986	
MATERIAL: N/A		TITLE: INSTALLATION ARRANGEMENT, 80.8 IN RADOME	
FINISH: N/A	SIZE: B SCALE: NONE	DRAWING NUMBER: 125804	REV: A
3rd ANGLE PROJECTION	FIRST USED: 6006	SHEET NUMBER: 1 OF 2	

DOCUMENT NO. 124225-4_A

TABLE 1: GENERAL ASSEMBLY WEIGHT

ITEM DESCRIPTION	WEIGHT (Lb.)
GENERAL ASSEMBLY:	TBD

TABLE 2: BASE ASSEMBLY WEIGHT

ITEM DESCRIPTION	WEIGHT (Lb.)
BASE ASSEMBLY: P/N122383-1 (STEEL BASE, NO A/C)	TBD
BASE ASSEMBLY: P/N122383-2 (AL BASE, NO A/C)	TBD
BASE ASSEMBLY: P/N122467-1 (STEEL BASE, EXTERNAL A/C)	TBD
BASE ASSEMBLY: P/N122467-2 (AL BASE, EXTERNAL A/C)	TBD
BASE ASSEMBLY: P/N122467-3 (STEELL BASE, 1M LEGS, EXTERNAL A/C)	TBD

TABLE 3: RADOME ASSEMBLY WEIGHT

ITEM DESCRIPTION	WEIGHT (Lb.)
RADOME ASSEMBLY: P/N 119838-1 (DRY WEIGHT)	140

PRELIMINARY

TABLE 4: A/C WEIGHT

ITEM DESCRIPTION	WEIGHT (Lb.)
AIR COOLED ENVIRONMENT UNIT: P/N 121958	TBD

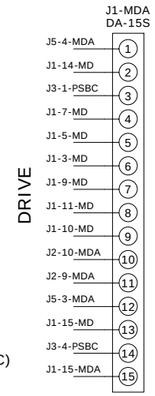
TOLERANCES UNLESS OTHERWISE SPECIFIED X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994	DRAWN BY: T PATEL DRAWN DATE: 09-01-06 APPROVED BY: APPROVED DATE:	Sea Tel® 4030 NELSON AVENUE CONCORD, CA 94520 Tel. 925-798-7979 Fax. 925-798-7986	
MATERIAL: N/A		TITLE: INSTALLATION ARRANGEMENT, 80.8 IN RADOME	
FINISH: N/A	SIZE: B SCALE: NONE	DRAWING NUMBER: 125804	REV: A
3rd ANGLE PROJECTION	FIRST USED: 6006	SHEET NUMBER: 2 OF 2	

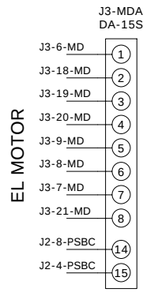
ASSY, MOTOR DRIVER, XX09
129628-1

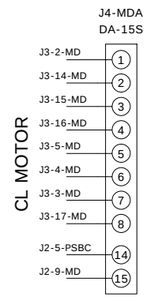
MOTOR DRIVER ASSY(MDA)
129628-1

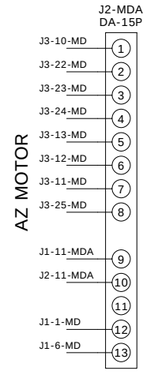
PCB, POWER SUPPLY BRAKE CONTROL(PSBC)
125252-1

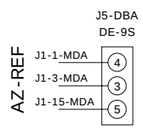
PCB, MOTOR DRIVER BOARD ASSY(MD)
129351-1

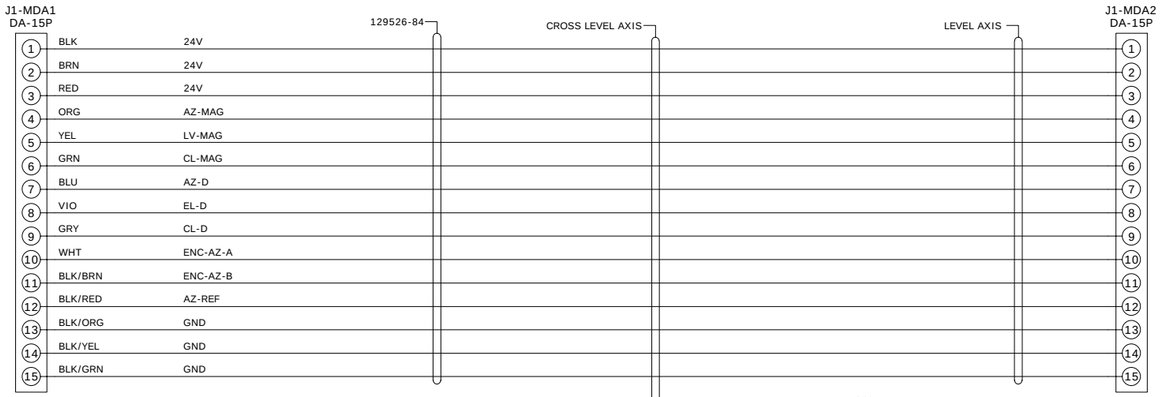


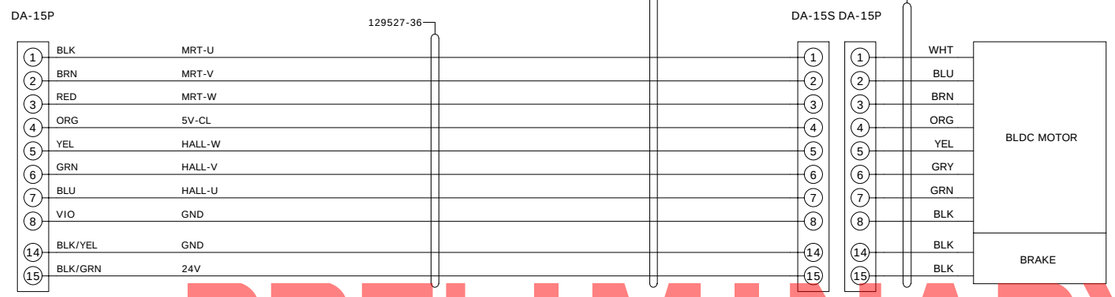


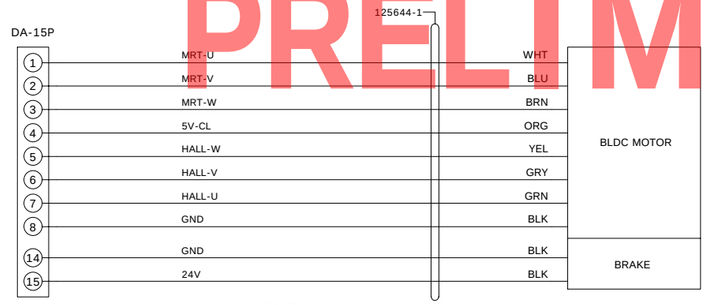


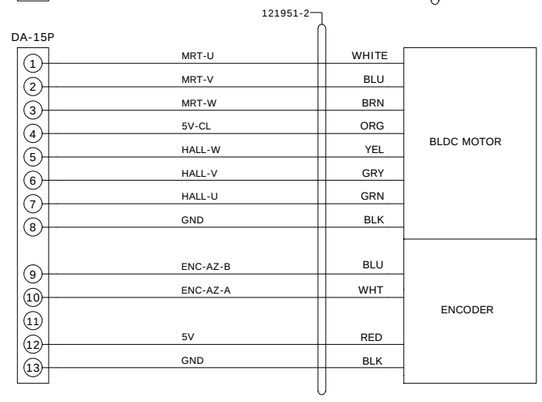


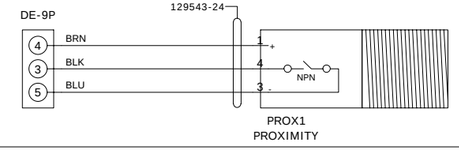




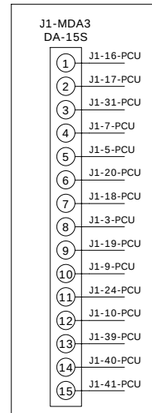








PRELIMINARY



ASSY, PCU, XX09
129308-1

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

DRAWN:	DATED: 11/12/08
CHECKED:	DATED:
QUALITY CONTROL:	DATED:
RELEASED:	DATED:

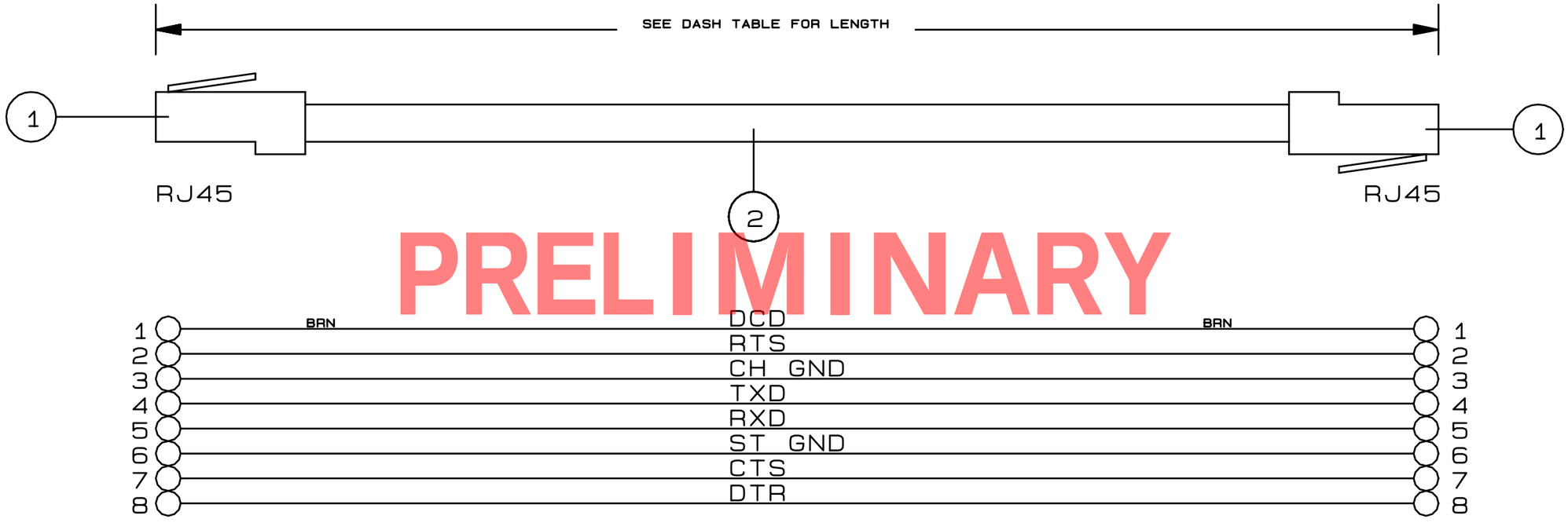
COMPANY: SEA TEL

TITLE: SCHEMATIC, PEDESTAL, XX09

CODE:	SIZE:	DRAWING NO:	REV:
	D	129755	X1

SCALE: SHEET: 1 OF 1

REV.	ECO #	DATE	DESCRIPTION	BY:
A		05/14/01	INITIAL RELEASE	DD
B		04/29/01	ADDED MFG. & VENDOR COLUMN	MSF
C	3577	6-11-02	DASH -3 ADDED	MSF
C1	N/R	12-4-02	WRONG LM REMOVED FROM DWG	MSF
C2	N/R	2-5-03	-4 ADDED	MSF
C3	5804	9-11-07	-5 ADED	MSF



REFERENCE:

118203 CABLE ASSY, MODULAR CORD
117979 CONTROL CABLE, REMOTE A/C

DASH NO.	DESCRIPTION	CABLE LENGTH
-1	EPIPE TO PDM INTERFACE BD.	6 INCHES
-2	EPIPE TO PDM INTERFACE BD.	8 INCHES
-3	EPIPE TO PDM INTERFACE BD.	4 INCHES
-4	EPIPE TO PDM INTERFACE BD.	7 INCHES
-5	TMS TO MODEM	60 INCHES

Sea Tel, Inc.
CONCORD, CA

SCALE:	APPROVED BY:	DRAWN BY: DD
DATE: 9-28-01		DWG SIZE:

TITLE: CABLE ASSEMBLY, RJ-45 SERIAL

MODEL:		DRAWING NUMBER	REV.
MCM-8/MCM-3	SHEET 1 OF 1	119478	C3

SINGLE LEVEL MFG BILL OF MATERIAL

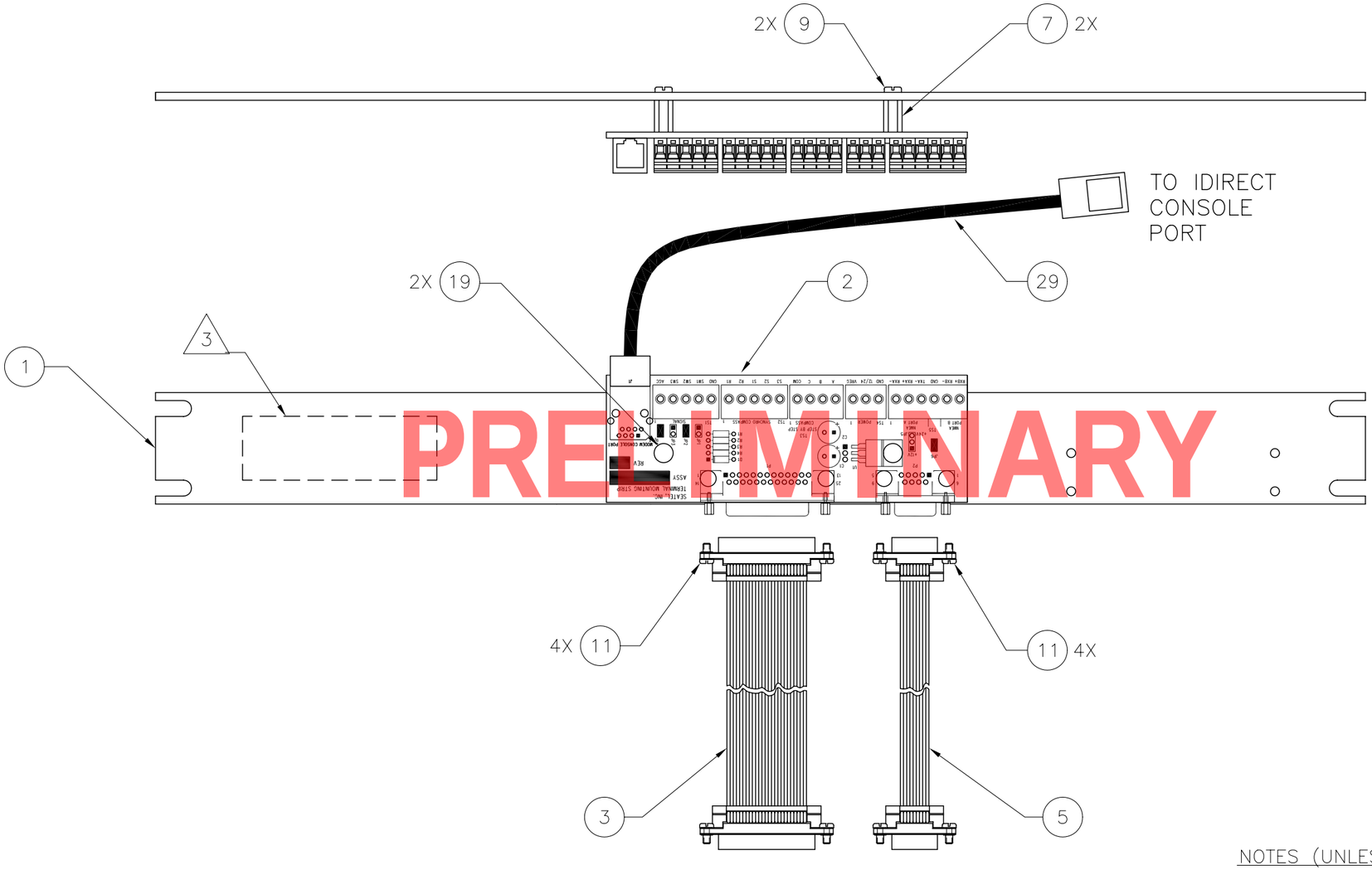
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	112657	D	MACHINING, TERMINAL MOUNTING STRIP	
2	1 EA	126865-2	E	PCB ASS'Y, TERMINAL MOUNTING STRIP,	
3	1 EA	112936-36	D1	CABLE ASS'Y, D-SDB, 25 PIN, 36 IN	
5	1 EA	116669-36	B1	CABLE ASS'Y, D-SUB, 9-PIN, 36 IN.	
7	2 EA	121228-3072		STANDOFF, HEX, F/F, 6-32 X .25 OD X .50,	
9	2 EA	114588-146		SCREW, PAN HD, PHIL, 6-32 x 3/8, S.S.	
11	8 EA	114588-107		SCREW, PAN HD, PHIL, 4-40 x 5/16, S.S.	
19	2 EA	114588-144		SCREW, PAN HD, PHIL, 6-32 x 1/4, S.S.	
29	1 EA	119478-5	C3	CABLE ASS'Y, RJ-45 SERIAL, 60 IN.	
30	1 EA	126877	B1	HARNESS ASS'Y, COMTECH MODEM INTE	

PRELIMINARY

SeaTel

TERMINAL MOUNTING STRIP ASS'Y, ACU

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	29-Sep-08	1 OF 1	**121628-4**	**N2**



PRELIMINARY

-4 SHOWN

NOTES (UNLESS OTHERWISE SPECIFIED):

1. APPLY ADHESIVE PER SEATEL SPEC. 121730
2. BAG ITEM 30 AND SHIP WITH PANNEL

SIZE	SCALE:	DRAWING NUMBER:	REV:
B	1/2	121628	N2
		SHEET NUMBER: 3 of 4	

SINGLE LEVEL MFG BILL OF MATERIAL

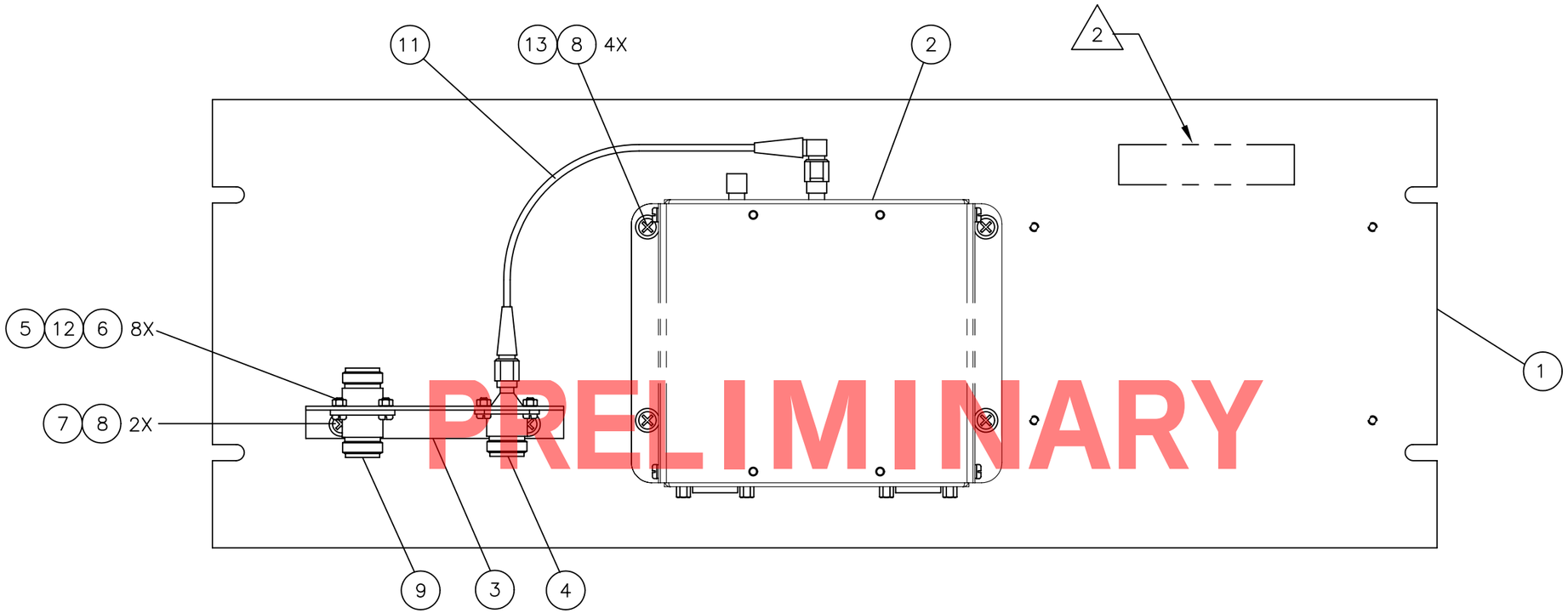
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	116880	F	PANEL MACHINING, RACK, BASE MUX	
2	1 EA	129613-2	A	MODEM ASS'Y, 400MHZ, 3 CH, BDE	
3	1 EA	116388	D	BRACKET, CONNECTOR	
4	1 EA	115492-1	C1	ADAPTER, N(F)-SMA(F), W/FLANGE	
5	8 EA	114588-107		SCREW, PAN HD, PHIL, 4-40 x 5/16, S.S.	
6	8 EA	114583-005		NUT, HEX, 4-40, S.S.	
7	2 EA	114588-144		SCREW, PAN HD, PHIL, 6-32 x 1/4, S.S.	
8	6 EA	114580-007		WASHER, FLAT, #6, S.S.	
9	1 EA	110567-19		ADAPTER, N(F)-N(F), STRAIGHT, FLANGE	
11	1 EA	113303-10	S	CABLE ASS'Y, SMA 90 - SMA (M), 8 IN	
12	8 EA	114580-005		WASHER, FLAT, #4, S.S.	
13	4 EA	114588-145		SCREW, PAN HD, PHIL, 6-32 x 5/16, S.S.	

PRELIMINARY

BASE MUX RACK PANEL ASS'Y, 400MHZ, RS-232

PROD FAMILY	EFF. DATE	SHT	DRAWING NUMBER	REV
COMMON	18-May-09	1 OF 1	**129710-1**	**A**

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	N/A	4-2-09	RELEASED TO PRODUCTION WAS REV. X1	MSF



PRELIMINARY

NOTES:
1. APPLY ADHESIVE PER SEA TEL SPEC. 121730
2. IDENTIFY PER SEA TEL SPEC. 122930 APPROXIMATELY WHERE SHOWN.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M – 1994	DRAWN BY: KRB DRAWN DATE: 01/23/09 APPROVED BY: APPROVED DATE:	Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986 TITLE: BASE MUX RACK PANEL ASS'Y, 400 MHZ, RS-232
MATERIAL: N/A FINISH: N/A	SIZE: B SCALE: 1/2	DRAWING NUMBER: 129710 REV: A
3rd ANGLE PROJECTION	FIRST USED: XX09	SHEET NUMBER: 1 OF 1

DOCUMENT NO. 124225-4_A